

# RADIO AMATEUR

JANUARY 1993

RRP \$3.25

- 10 GHz record broken . . .
- Product Review — Baycom Packet Modem
- Amateur Radio and EMC (Part 1)



ALL-DAY  
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THE WIA RADIO AMATEUR'S JOURNAL

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### Cover

Mal VK3BBU and Max VK3WOD at Mt Worth (Vic) ready to establish a new 10 GHz Video record. Refer to the article on Page 8.

The cover photograph and photographs accompanying this article were kindly supplied by Peter Ford VK3TAF. Colour processing is with the compliments of BOND COLOUR LABORATORIES, Richmond Vic.

## Amateur Radio Service

A radiocommunication service for the purpose of self-training, intercommunication and technical investigation carried out by amateurs, that is, by duly authorised persons interested in radio technique solely with a personal aim and without pecuniary interest.

## Wireless Institute of Australia

The world's first and oldest National Radio Society Founded 1910

Representing the Australian Amateur Radio Service — Member of the International Amateur Radio Union

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## Editor's Comment

Bill Rice VK3ABP  
Editor

### Exam Reports

You will be excused if you immediately imagine that I am going to talk about the WIA Exam Service. No, I am NOT! That can be safely left to the team in the Federal Office. Instead, I want to mention an examination recently conducted by half a dozen members of the Redcliffe Radio Club (VK4), in which the candidate was this magazine (or more specifically the October 1992 issue). The Redcliffers then sent us a report entitled "The Worth of 'Amateur Radio'".

I am happy to be able to say that we passed their exam! Perhaps not with "flying colours", perhaps "damned with faint praise", but still with the score above the acceptable minimum. I think it may interest many of you if I quote some of the examiners' remarks.

First, a solid body-blow; "recently given 24 mint issues of AR by a clubmate. By mint I mean unopened — still in their plastic wrappers!" Having survived that depressing assessment, we were then "looked at ... with a fairly critical eye". My editorial comments "are becoming treatises of a bygone era ... a perception of old-world attitudes". Thank you, Redcliffers! I don't know whether to feel flattered or insulted! They go on to say that I "should canvass important/controversial areas of the WIA and the Amateur Service". I thought I was hitting fairly hard in October, talking about "anti-social and un-civilised" behaviour, but it seems I have a clear-

ance from Redcliffe to hit even harder!

The writer of the report is Editor of the club's quarterly magazine and "would not wish to produce 12 x 400 word plus editorials each year". I do sincerely appreciate his sympathy.

WIANEWS came next, with each of 20 news items being critically examined. A mixed bag, but generally favourable. The comments and statistics about exams were "self-serving drum-beating", but almost everything else was marked "good". Much the same applied to the technical articles, even though the examiners were initially "prepared to 'tip a bucket'".

Some of the columns were thought to be a bit long, but here the examining panel became rather subjective, different people having different preferences. This was no surprise to us, trying each month to produce a more balanced magazine!

The final paragraph was a gem! "We approached this originally with the idea of proving 'Amateur Radio' a waste of fine trees, but instead came away knowing that it's not a bad read and deserves its spot on the bookshelf". Thank you Redcliffe, for an assessment. You didn't say, "could try harder", but we are going to anyway!

To an examination of another kind. Last month I "re-cycled" some of my 1984 editorial comments, and thought I might continue with that process. First, of course, all that "old stuff" must be read again. But look at all that other material we published in 1984. And 1985,



the WIA 75th Anniversary Year. Masses of information, history, even news. "Bygone ages" can be very interesting!

Back in those days, barely eight years ago, we were publishing 72 page issues, with 20 pages of advertising. In the last issue (December 1992) we had nine pages of advertising, and that was the best for many months! We had a 60 page issue rather than 56, because of the colour centre spread for Dick Smith Electronics. Since 1984, by stringent economies, more of the work "in-house", and the increasing productivity of modern technology, we have been able to hold our costs down far better than seemed possible.

Unfortunately, the same economic landslide, since 1987, which has cut advertising from 20 pages to five or six has also cut membership to just under 6000, from a peak of over 8000. May we hope that perhaps 1992 was the negative peak of the economic cycle and that 1993 may in fact be a Happy New Year!

## Amateur Radio Awards

At the Publications Committee meeting held on 1st December 1992, the annual Amateur Radio awards were allocated.

**Al Shawsmith Award for Journalistic excellence** —

Barrie Gillings, VK2DWC — for the article "A Mother of a Storm". Barrie's graphical and humorous description of what must have been a terrifying period, during which his house seemed about to collapse around him.

### Technical Award —

Drew Diamond VK3XU — for a number of high quality technical articles. Drew consistently provided a first class presentation of his material, including high grade drafting of the diagrams. His articles required little or no editing.

### Higginbotham Award —

Jointly to Ron Fisher VK3OM, and Bill Roper VK3ARZ — for voluntary

service to the WIA over 17 years of production of the Federal Tables.

The committee recognised that one of the joint recipients, Bill Roper VK3ARZ is currently a paid employee of the WIA. However, notwithstanding this, Bill for many years prior to, and during the last four years of his engagement, as an UNPAID VOLUNTEER readily performed the duties as stated above. In this respect the committee was satisfied that there was no conflict of interest, and had great pleasure in confirming the award.

The Publications Committee congratulates all recipients.

## WIA Divisions

The WIA consists of seven autonomous State Divisions. Each member of the WIA is a member of a Division, usually their residential State or Territory, and each Division looks after amateur radio affairs within their State.

| Division  | Address   | Officers  | Weekly News Broadcasts  | 1993 Fees   |
|---|---|---|---|---|
| VK1   | ACT Division<br>GPO Box 600<br>Canberra ACT 2601<br>Phone (06) 247 7006   | President Christopher Davis VK1DO<br>Secretary Jan Burrell VK1BR<br>Treasurer Ken Ray VK1KEN  | 3.570 MHz<br>2m ch 6950 Rebroadcast Mondays 8pm<br>70 cm ch 8525 2000 hrs Sun   | (F) \$70.00<br>(G) (S) \$56.00<br>(X) \$42.00   |
| VK2   | NSW Division<br>109 Wigram Street<br>Parramatta NSW<br>(PO Box 1066<br>Parramatta 2124<br>Phone (02) 889 2417<br>Fax (02) 633 1525    | President Terry Ryeland VK2UX<br>Secretary Bob Lloyd Jones VK2YEL<br>Treasurer Bob Taylor VK2AOE<br>(Office hours Mon-Fri 11.00-14.00<br>Wed 1900-2100) | From VK2W1 1.845, 3.595, 7.146*, 10.125, 24.950, 28.320, 52.120, 52.525, 144.120, 147.000, 438.525, 1281.750 (*morning only) with relays to some of 14.160, 18.120, 21.170, 584.750 ATV sound. Many country regions relay via a local 2 metre repeater. Sunday 1000 and 1915. Highlights included in VK2AWX Newcastle Monday 1930 on 3.593 plus 10mx, 2mx, 70cm, 23cm. News headlines by phone (02) 552 5188. Some broadcast text can be found on the Packet network. | (F) \$66.75<br>(G) (S) \$53.40<br>(X) \$38.75   |
| VK3   | Victorian Division<br>403 Victory Boulevard<br>Ashburton Vic 3147<br>Phone (03) 885 9261  | President Jim Linton VK3PC<br>Secretary Barry Wilton VK3XV<br>Treasurer Rob Halley VK3XLV<br>Office hours Tue & Thur 0830-1530                          | 1.840MHz AM, 3.615 SSB, 7.085 SSB, 53.900 FM(R) Mt Dandenong, 146.700 FM(R) Mt Dandenong, 146.800 FM(R) Mildura, 146.900 FM(R) Swan Hill, 147.225 FM(R) Mt Baw Baw, 147.250 FM(R) Mt Macedon, 438.075 FM(R) Mt St Leonard 1030 hrs on Sunday.   | (F) \$72.00<br>(G) (S) \$58.00<br>(X) \$44.00   |
| VK4   | Queensland Division<br>GPO Box 638<br>Brisbane QLD 4001<br>Phone (07) 284 9075  | President John Aarsee VK4QA<br>Secretary Ken Ayers VK4KD<br>Treasurer David Travis VK4ATR   | 1.825, 3.065, 7.118, 10.135, 14.342, 18.132, 21.175, 24.970, 28.400 MHz. 52.525 regional 2m repeaters and 1296.100 0900 hrs Sunday. Repeated on 3.605 & 147.150 MHz, 1930 Monday  | (F) \$70.00<br>(G) (S) \$56.00<br>(X) \$42.00   |
| VK5   | South Australian Division<br>34 West Thebarton Road<br>Thebarton SA 5031<br>(GPO Box 1234<br>Adelaide SA 5001)<br>Phone (08) 352 3428 | President Bob Allen VK5BJA<br>Secretary Roland Bruce VK5OU<br>Treasurer Bill Wardrop VK5AWM   | 1820 kHz 3.550 MHz, 7.095, 14.175, 28.470, 53.100, 145.000 147.000 FM(R) Adelaide, 146.700 FM(R) Mid North, 146.900 FM(R) South East, ATV Ch 34 579.000 Adelaide, ATV 444.250 Mid North Barossa Valley 146.825, 438.425 (NT) 3.555m 146.500, 9090 hrs Sunday  | (F) \$70.00<br>(G) (S) \$56.00<br>(X) \$42.00   |
| VK6   | West Australian Division<br>PO Box 10<br>West Perth WA 6005<br>Phone (09) 386 3888  | President Cliff Bastin VK6LZ<br>Secretary John Farnan VK6AFA<br>Treasurer Bruce Hedland-Thomas VK6OO  | 146.700 FM(R) Perth, at 0930 hrs Sunday, relayed on 3.560, 7.075, 14.115, 14.175, 21.185, 28.345, 50.150, 438.525 MHz. Country relays 3.582, 147.350(R) Busseton 146.900(R) Mt William (Bunbury) 147.225(R), 147.250(R) Mt Saddleback 146.725(R) Albany 146.825(R) Mt Barker broadcast repeated on 146.700 at 1900 hrs.   | (F) \$60.75<br>(G) (S) \$48.60<br>(X) \$32.75   |
| VK7   | Tasmanian Division<br>148 Derwent Avenue<br>Lindisfarne TAS 7015  | President Tom Allen VK7AL<br>Secretary Ted Beard VK7EB<br>Treasurer Peter King VK7ZPK   | 146.700 MHz FM (VK7RH) at 0930 hrs Sunday relayed on 147.000 (VK7RAA), 146.750 (VK7RNW), 3.570, 7.090, 14.130, 52.100, 144.100 (Hobart) Repeated Tues 3.590 at 1930 hrs   | (F) \$67.00<br>(G) (S) \$53.65<br>(X) \$39.00   |
| VK8   | (Northern Territory is part of the VK5 Division and relays broadcasts from VK5 as shown received on 14 or 28 MHz).                    |   |   | Membership Grades<br>Full (F) Pension (G)<br>Needy (D) Student (S)<br>Non receipt of AR (X) |
| Note: All times are local. All frequencies MHz. |   |   |   | Three-year membership available to (F) (G) (X) grades at fee x 3 times.                     |

# WIA News

From the WIA Federal Office

## New Licence Conditions

The SEANET Convention in Darwin was the scene for the announcement of forthcoming changes to the amateur radio licence conditions, given in a speech on Saturday night 31 October by the Hon. Warren Snowden MP, standing in for the Minister for Transport and Communications, Senator Bob Collins.

The speech was taped and broadcast nation-wide on each Divisional broadcast on Sunday morning, 1 November, through a telephone hookup to all Divisions from Darwin arranged by Darwin ARC President, Bill "Spud" Murphy VK8ZWM and sponsored by Telecom Australia. The event was unprecedented in WIA history.

Most WIA members will have heard the broadcast speech, which indicated that the proposed changes to the licence conditions would come into effect "early in 1993" and that the specifics of the proposal would be published in AR magazine "very soon".

However, while it was expected that documentation would be forthcoming from the Department of Transport and Communications (DoTC) in mid-November, in time for publication in the December issue, there has been a delay in drafting sections of the revised licence conditions.

As soon as the completed new licence conditions are received from DoTC, a detailed summary will be provided on WIA Divisional news broadcasts and the full details published in

Amateur Radio magazine.

Meanwhile, to reiterate, the main points outlined in the announcement of 31 October were:

- Introduction of a no-code **Novice Limited** class of licence allowing use of voice and packet radio transmissions in the 144 MHz and 432 MHz bands;
- Allowing Limited Licences use of FM telephony on the 29 MHz band, encouraging more use of 10m.
- Holders of the Combined Novice and Limited class of licence would be recognised under a single category to be known as the Intermediate class licence.
- Novice stations to be permitted a limited increase in power, consistent with the state of technology and the availability of equipment.
- Usage of packet radio technology will see unnecessary technical rules removed.
- Rules applying to the use of repeater stations will be simplified.

In his address, Warren Snowden said many of the previous rules were unnecessarily restrictive and impeded the use of new technology.

He went on to add, "I would like to congratulate the Wireless Institute of Australia for its valuable contribution on behalf of its members to the development of reforms to further deregulate the service for the benefit of the amateur operators throughout Australia."

Topping off the good

news of the main announcement, Warren Snowden advised that amateur licence fees would remain at \$35 for 1993.

## More Good Publicity for Amateur Radio

Amateur Radio gained valuable public exposure at the Australian Broadcasting Commission's 60th Birthday celebration Picnic in the Park held in Sydney's Parramatta Park early in November.

NSW Division Councilors and volunteers organised and manned a display van with an exhibition along a theme of "past and present", showing the link between the gestation of broadcasting and early amateur radio, and the development of amateur radio into a modern technological hobby.

Some choice items from the Division's historic radio collection, organised by Aub Topp VK2AXT were on display, while some up-to-date Kenwood transceivers borrowed from the Division's VK2BWL station at Amateur Radio House Parramatta were activated for live demonstrations. Just to cap the historic theme, the special callsign VII150SYD was used.

The display was well-positioned to be seen by the tens of thousands of ABC listeners and viewers who turned up at the event. A large number of publicity pamphlets were given away and those manning the stand went hoarse answering questions.

NSW Divisional President, Terry Ryeland VK2UX, was interviewed on-air on station 2BL in the middle of the day by ABC radio personality Bob Hughes — who also happens to hold the callsign

VK2YOW (yes, he's a member!).

As a result of follow-up publicity, the local newspaper group, Cumberland Newspapers, came around to the Division and interviewed Terry VK2UX and Aub VK2AXT. This which appeared along with a photograph of the interviewees in late November.

## EMC Standards

The Standards authorities of Australia and New Zealand are moving towards the introduction of regional standards covering a range of electronic and electrical appliances and equipment which can either cause, or suffer from, RF interference.

Standards Australia issued new joint Australian and New Zealand standards in October. A complete set of these has been purchased by the Federal Office and held in the library there.

RF immunity levels for TV and broadcast receivers is covered by one of these new standards, while others cover the *unwanted RF* energy (RFI) generated by VCRs, TV and sound broadcast receivers, computers and other information technology equipment, vehicle ignition systems and power tools.

The issuing of these new standards is an important preliminary to revisions currently under way to the Radiocommunications Act 1983. When originally drafted, provision for such electromagnetic compatibility (EMC) standards was included in the Act, but Australian governments to date have been reluctant to make mandatory standards, perhaps under pressure from manufacturers and importers.

It now seems such EMC standards will become a

technological imperative for consumer goods in Australia, long after wide adoption in Europe.

### Call Book on Disk?

The 1993 Call Book can not be made available on computer disk, or any other form of electronic data.

The Federal Office receives a number of requests each year to supply the Call Book in such form. It seems like a great idea in this "information age", but the contract between the Australian Government Publishing Service and the WIA prohibits the WIA from doing it.

The WIA only has the right, by way of licence, to publish the Call Book in its printed book format. This, and the copyright provisions, excludes other means of publishing the information, including in electronic form, such as supplying the information as a text file on computer disk.

### 1Z 160m "Have A Go" Activity

This popular activity for 160m enthusiasts and experimenters will be on again this March, hosted by the Hastings Branch 13 of the NZART.

It's not a contest, just an activity to encourage experimentation on the band as well as some recreation.

But to provide flexibility and to encourage and enable the use of enhanced antennas, the organisers have scheduled the activity to coincide with the NZART Field Day — but it does not form any part of the Field Day contest. It does provide a chance, the organisers say, to guarantee a result for your experimental effort.

The 160m Have A Go Activity runs in two time blocks, from 2000 hrs NZT on Friday 5/3/93 to 0300 hrs

NZT Saturday 6/3/93, then from 2000 hrs on 6/3/93 to 0300 hrs on Sunday 7/3/93.

Prime frequency is 1840 kHz, but you are encouraged to use anywhere in the band, as has happened in past Activities. Mode is LSB or CW.

Contact for more information is David Walker ZL3DK, 36 Ardrossan Ave, Flaxmere, Hastings NZ.

### Want to Contact the Federal Office on Packet?

You can't. While, as a packet operator, you have probably noticed the monthly Federal WIANEWS items disseminated through the packet bulletin boards network by VK3WIA, if you have tried to send a message back to VK3WIA, you're probably wondering why you've never received a response.

That's because, simply, the regulations prohibit it. The relevant section says that a station shall not be used: *"to transmit material relating to industrial, commercial, political, social or religious matters"*. Unfortunately, almost all correspondence with the WIA Federal Office falls into the commercial category. This particularly includes subscription matters, changes of address or callsign, missing AR magazines, etc.

So as not to breach the regulations, VK3WIA is used only for sending out news items relating to the Amateur Radio Service. VK3WIA does not accept incoming packet traffic.

So, if you want to contact the Federal WIA, stick to the common means: phone, fax or Australia Post. Contact details are given on page one of each issue of Amateur Radio magazine, and page one of the 1993 Call Book. Divisional contact details are

given on page three of each AR and on page two of the 1993 Call Book.

### Progress at VNG

Standard frequency and time signal service station, VNG, located at Llandillo west of Sydney, has secured recurrent funding to keep it on the air, and now transmits on a new frequency — 2.5 MHz — according to a release from VNG Users Consortium Secretary, Dr Marion Leiba VK1VNG/VK1BNG.

The new 2.5 MHz signal is a 1 kW transmission from a second-hand Harris-Gates transmitter, radiated from a vertical antenna. The first on-air tests took place on 9 September 1992 and "quasi-continuous" transmission started as a test on 7 October.

"This additional frequency is now permanent, barring unforeseen problems," said Dr Leiba.

The 2.5 MHz signal is intended primarily for the Sydney area where users were having difficulty receiving the VNG transmissions on 5.0, 8.638, 12.984 and 16 MHz which are radiated from horizontal antennas.

The National Standards Commission succeeded in obtaining recurrent funding for VNG as part of a New Policy Proposal. VNG has been funded to date by donations from users (who formed the voluntary VNG Users Consortium) and funding from The Australian Surveying and Land Information Group (AUSLIG), who provided running costs for the past four years and funded the reassembly of the station at Llandillo.

A standby transmitter has been obtained ex-Radio Australia. It is an STC, the same as the other four at VNG. A second "talking clock" is being constructed,

as backup to the unit that went to air from January 1992.

### Basic Radio Manual

The NZART has published a new, revised edition of its *Basic Radio Training Manual*. While it is aimed to cover requirements of the New Zealand amateur licensing system, the publication may be of interest and use to people studying for their licence in Australia as it covers fundamental radio theory.

A copy is in the hands of Brenda Edmonds VK3KT, who is to review it for an early issue of Amateur Radio magazine.

For people outside New Zealand who wish to obtain a copy, it costs A\$13.00 post-paid for single copies. NZART advise that discounts are available if ordering ten or more copies. Write to NZART, PO Box 40 525, Upper Hutt, NZ.

### Station Statistics

As at 30 September, there were 18,701 station licences held by Australian radio amateurs. The "most populous" state is NSW, with 5461 licences held, followed by Victoria, with 5002.

The number of repeater licences is 320, 85 of which are in NSW, and 84 in Victoria, while Queensland follows close behind with 70. There are 28 beacon licences.

### Hams and Hurricanes, Again

Less than a month after Hurricane Andrew devastated Florida in the United States (see WIANEWS, December 1992 issue), Hurricane Iniki swept across the Hawaiian island of Kauai and the western coastline of Oahu on 11 September 1992.

The ARRL newsletter of

November 12 carried an extensive report on the involvement of amateur radio during and after the emergency.

The Radio Amateur Civil Emergency Service (RACES) was activated when Iniki approached the vicinity of Hawaii, which provided vital communications links on VHF FM and packet. Other individuals provided communications too, via VHF FM voice, VHF packet and HF packet. At times, amateur radio provided the only communications links, according to the report.

A great deal of health and welfare traffic was passed via amateur radio during the restoration efforts once the hurricane had passed. Two operators originated more than 1000 messages in six non-stop hours, completing calls to as far away as Sweden, the ARRL newsletter reported. Over 30 in-

dividual amateurs were involved.

### New WIA Members

The WIA bids a warm welcome to the following new members who were entered into the Federal Membership Register during the month of November 1992

L20850 MR B EDGE  
L20851 MR R S FOOTE  
L20872 MR S HIGHLEY  
L30815 MR M MASTROCIQUE

L30827 MR G DUGAN  
L40323 MR R N THORNTON  
L40324 MR N DUMMA  
L60319 MR R W BARR  
VK2AP MR J R THURSTON  
VK2URJ MR I R JONES  
VK2NRX MR R BUNN  
VK3DEB MR B THEODORE  
VK3EYN MR E V N SHAW  
VK3JAH MR D BARROW  
VK3PQ MR M BURRELL  
VK3YDR MR N DARRAGH  
VK4DBI MR T K MILLION  
VK4FRG MR G D ROWE

VK4MCA MR J MCASPURN  
VK4NPH MR P B HARDING  
VK4TDS MR D J HOLZNAGEL  
VK4VDZ MR S P BONNELL  
VK4WTN MR W T NEWPORT  
VK5YLE MR L McDONALD  
VK6ADF MR P R HECKINGBOTTOM  
VK6AUD MR P J BOTTRELL  
VK6BHI MR C J LORD  
VK6XY MR A M KEIGHTLEY  
VK6ZCW MR C W BROOKE  
VK6ZJD MR B J DOLPHIN  
VK7PAO MR T C BRUNDLE

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## ANNINDEX Annual Index 1992

Due to the earlier closing deadlines for this issue (brought about by the Christmas and New Year holiday season), the Annual Index of articles published in AR during 1992 has regrettably been held over until the February 1993 issue ... VK3UV Production Editor.

**ICOM**  
adds a new sophistication to the meaning of the word basic...

To most of us basic means you miss out on performance and quality, but not any more, the new Icom IC-728 might be Icom's 'basic' H.F. transceiver, but in fact it makes many other transceivers look pretty basic by comparison!

**\$1678** r.r.p. Call for special introductory pricing!

Please allow \$36 for postage and insurance within Australia mainland or Tasmania. Other areas please call for pricing. E&OE, all prices and information subject to change without notice.



You might think that a few years of reviewing H.F. transceivers would make any amateur a bit jaded, well obviously not, here is what Neil Duncan, VK3OK, had to say about the IC-728...

*"Getting the IC-728 up and running is a treat"*

*"It almost runs itself — the learning time is very low"*

*"DX'ing on 20 metres is a snap with a hot little receiver like this one!"*

*The manual "is an absolute pleasure to use"*

*"I must say that the IC-728 offers very good value for money indeed."*

Amateur Radio Action — 9 June 1992

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# Point report from the October Board meeting

**C**ONTINUING THE President's undertaking to provide a point summary of each WIA Board meeting, the report on the meeting held over the weekend 24/25 October 1992 follows. Further details may be obtained from your Divisional Federal Councillor.

The October meeting of the WIA Board:

- Accepted the resignation of Terry Ryeland as a Director and appointed Roger Harrison, the VK2 Federal Councillor as a Director in his place.
- Received a report from the President on his visits to Divisions and radio clubs as reported in WIANEWS.
- Received a report from the General Manager on Federal Office matters. The office LAN server has been upgraded. Difficulties with customs duty certifications for a particular transceiver have been resolved. The General Manager has been able to take some recreation leave.
- Received a report on publications that delivery of *Amateur Radio* magazine to many members, commencing from the December issue, may be through a delivery agency other than Australia Post.
- Received a report on examinations which showed the average pass rate remains 51%. The income from examinations, after allowing for foregone income on members' funds, now shows the break-even point will now be in around two and a half years time. The General Manager is being subjected to unwarranted personal abuse on packet networks and through the mail as a result of the examination fees increase. The Board agreed DoTC be approached to in-

crease surveillance and audit of examinations as a matter of urgency.

- Heard from David Wardlaw about his paper to Communication 92 in Sydney and his recent attendance at an IARU Administrative Council meeting as the Region III representative. David also spoke on his continuing involvement in WARC related matters.
- Reviewed the draft WIA 1993 Program Objectives and after some amendments adopted them. The Objectives will be published in *Amateur Radio* in due course for member's information.
- Directed the Secretary/Manager to enter into negotiations to create a national heading in the "yellow pages" of "Clubs -Amateur Radio".
- Appointed Bob Godfrey VK4BOB as Federal Video Tape Co-ordinator to replace John Ingham.
- Agreed there was not unanimous support for a Federal 008 number; and that 0055 numbers were seen as a Divisional responsibility.
- Reviewed Divisional Bookshop activities, aired problems and further agreed the matter of club listings was a Divisional one.
- Observed there was a perceived need for a novice correspondence course and a supplier of good resource material.
- Adopted the 1993 Planning Budget Worksheets, as amended, as a planning basis for 1993. These are based on no increase in the Federal component of subscriptions for 1993. In so doing the Board noted the surplus was only 2.7% of gross income.
- Examined a paper from Peter Maclellan on trading policy consider-

ations and agreed "trading" was not to be excluded from the revision of the Articles

- Adopted in principle both half yearly and three yearly subscription options. The General Manager advised, because not all Divisions wished to introduce the half yearly option, it was impractical to proceed with this initiative.
- The revision of beacon policy was referred to FTAC, with a report requested to the Board's sub-committee, Roger Harrison, for the next meeting.
- The Board resolved to ask DOTC for permission to use special callsign prefixes during international contests chosen by the Federal Contest manager.
- Examined recommendations from WICEN concerned with callsigns and frequencies, and agreed to request an options paper from WICEN. Peter Maclellan would then develop options for the General Manager to use when negotiating with DoTC.
- Reviewed a batch of revised Policy Statements and adopted those concerned with Gentlemen's Agreements, EMC, Novice Licensing, Third Party Traffic, QSL Bureaux, Narrow Band Modes, Operation of BBS, Intruder Watch, Education and Concessional Membership. The Regulations concerned with affiliated organisations were also adopted.
- Received a paper from Roger Harrison on Amateur Radio magazine policy issues, for further Board consideration.
- Agreed the Public Relations Policy Statement required further revision.
- Resolved to prepare a Standing Order on the release from Board confidentiality by Board members of material before the Board for consideration.
- After a thorough review, resolved that with regard to news releases from the Federal WIA: Federal tapes as currently prepared will be discontinued, this does not reflect upon the integrity and dedicated service of the tape coordinators over the past 17 years; The preparation of WIANEWS will continue and authorised news

releases will be made available to Divisions, in addition to the current recipients, by the Secretary. A release from the Board about these matters will be prepared by the chairman.

That release became the substance of the final Federal tape broadcast over the SEANET 92 weekend.

- Roger Harrison was appointed the Federal Media Officer.
- Noted the Federal Media Officer would process the WIA policy on responding to inaccurate public statements.
- Noted the General Manager's contract calls for an indication of acceptance of options for a second and final five year term by 10 November

1992, and noted his duties will be varied as a result of restructuring; resolved to seek the General Manager's agreement to extend his decision point by 12 months.

- Appointed a sub-committee of the President, Vice-president and Peter Maclellan to progress the General Manager's duty statement revision and contract renewal.
- The Board met formally for almost 15 hours and considered over 30 agenda items. A further 6 lower priority items were carried over to February. In addition to the formal meeting Federal Councillors met informally for 2 1/2 hours. The Board will meet again on 20-21 February 1993 in Melbourne.

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tuning screw which allows some frequency adjustment to within the band. At least a relatively simple way of generating RF energy was available at low cost. Within an intruder alarm, there is a diode detector suitable for use at the microwave frequencies. This could be used to detect energy radiated from another intruder alarm. If the frequencies used by two units were separated by a small amount, then each oscillator would also serve as a local oscillator for the diode being used as a mixer providing an Intermediate Frequency that may be fed to a conventional receiver.

These efforts were well rewarded with a number of contacts being conducted across 30-40 feet in the back yard. Modulation is achieved by impressing a little audio to the voltage supply of the Gunn diode oscillator. The resultant signal is FM with the deviation being determined by the level of audio. The overall sensitivity of the detection system left a lot to be desired, after all, a loud voice would have the same communication effectiveness!

More recently, with the advent of satellite TV systems, some microwave equipment for receiving signals on the 12 GHz satellite TV band has become available. Could some of this equipment be modified down a bit for use on the 10 GHz band? This equipment consists of a LNC or Low Noise Converter which is fitted at the antenna and is coupled to a tuneable TV downconverter. The signals normally received are FM and are converted to AM TV for feeding to a standard TV set by the downconverter. The improved sensitivity offered by this combination appeared to offer increased possibilities.

### New Receiver

Fortunately at the local club, through the efforts of one of the members, a number of LNCs and downconverters were made available at good amateur prices. A little bit of minor surgery on an LNC with a few tabs of copper strip to lengthen the microstrip tuned lines shifted the tuning into the 10 GHz band. Other LNCs were treated with silver paint with similar effectiveness. As the local oscillator is at 11.2 GHz and the IF is 850-1400 MHz then only the front end needed to be tuned from 12.5 GHz to 10 GHz for the same IF to feed the downconverter.

# Just for the record.... (New 10 GHz record)

Peter J Ford VK3TAF

**"B**ECAUSE IT IS there." a quotation from Sir Edmund Hillary when asked why he climbed Mount Everest in 1953. Such is the spirit encompassed by a small group of amateurs in Melbourne in their pursuit of something different. For some time, this group has been experimenting, testing and rebuilding in an effort to enhance their knowledge of little known parts of the spectrum available. Contacts with others using electromagnetic waves of various frequencies is a common goal, with the ability to establish this over ever increasing distances adding an extra challenge.

Recent articles indicated that the 10 Gigahertz band offered considerable room for experimental activity with vir-

tually no commercial amateur equipment being readily available. Any equipment used would either have to be built from scratch or perhaps some other commercial equipment may be modified or "cannibalised" for amateur use. Propagation characteristics were scarcely that of the DX bands or even the traditional VHF bands. Just what are the significant features of propagation in this unknown territory?

Initial efforts to generate energy in this band were confined to simple oscillators using surplus microwave intruder alarms. These devices utilise a Gunn diode in a cavity and oscillate in this configuration at about 10.5 GHz, just above the allocated amateur band. Fortunately, these units have a small





**Max Crews VK3BBU .. "Success"**

Preliminary tests on the receiving equipment tracking a microwave intruder alarm sitting on the rear shelf of a mobile car showed signals receivable from over two kilometres away. Although the signal had no modulation apart from that imparted by the vibration in the car, at least a better receiving system was now available.

Now that a suitable receiving system was available, thought was again turned to suitable transmitting equipment. The receiving system is designed for FMTV so a matching transmitting system must be arranged. A Gunn diode must FM if the supply voltage was varied with signal. Unfortunately FM linearity suffered greatly when the deviation required by the receiving system was attempted. Better modulation could be obtained if the modulation was applied to a varactor diode mounted in the oscillator cavity with the Gunn diode. Microwave Associates provide a Gunnplexer assembly that has the required Gunn and varactor in the oscillator cavity and tuned to the 10 GHz amateur band. As these units were already in possession, then it was a relatively simple matter to build a video modulator to take signal from a video camera and provide correct modulation to the varactor. With a lit-

tle bit of adjustment and fiddling, good pictures were being passed from one side of the shack to the other.

Again the advent of satellite TV yields further equipment for amateur use. Antenna systems used in the microwave region are commonly parabolic dishes. With true amateur spirit, a pair of small (4 foot) surplus satellite dishes were acquired. Similarly, use of suitable pieces of waveguide feed and radiator were also found.

### **First Attempt**

In May, 1992, an attempt was made to establish contact from two points near Melbourne with a two-way video contact. Each party loaded all necessary equipment and at the appointed time, established contact using a two meter liaison frequency. Soon, pictures were being sent and received in one direction. Generator problems caused some concern initially at one site but the low voltage was soon overcome. When a change of direction in the opposite direction was called for, no signals were evident. Tests at the transmitting site confirmed that the transmitter was, in fact, working correctly. As the receiving station could not receive its own signal, it was obvious that the fault lay in the receiv-



**10 GHz Horn Antenna, and equipment used by the group as successful back up equipment.**

ing equipment. Considerable effort was made to isolate and correct the fault over three hours in the cold, wet outdoors to no avail. A certain Irish gentleman had definitely visited us!

After returning to the relative comfort of the shack, it was found that an intermittent connector on the back of the LNC had chosen to become more permanent. Considerable discussion led to numerous new names for the particular type of connector used.

With the workload imposed upon one of the members of the group, another being temporarily relocated from Melbourne and the wet and cold of Winter, any further attempt would have to be delayed for some months. Weekend work and likely fine weather indicated that Friday, 23rd October would be a good day for the teams to attempt a two-way video contact and make some measurements for possible future work.

### **Antennas**

From signal measurements made in the earlier attempt, a small horn was constructed to see if sufficient signal would be available over the path and compare it with the four foot dishes. An evening's work and some pieces of

circuit board produced a horn antenna of 21-22 dB gain. Care was taken so that no solder was on the inside surface of the horn as the lead alloy is an excellent attenuator at microwave frequencies. The inside joints were made with burglar alarm tape as used on windows. This material is an excellent jointing material at these frequencies.

Mal VK3BBU, Max VK3WOD and Peter VK3TAF arrived at Mount Worth, some 15 kilometres from Waragul in Gippsland at about 11.30 a.m. and began to set up the equipment. Jim VK3ZYC and Bill VK3JTW had already arrived at Johns Hill in the Dandenongs. Unfortunately, George VK3ZNE was unable to accompany us this time due to ill health. The dish was quickly mounted on the support frame on the tray of the truck and aimed in the direction of Johns Hill "somewhere over there". When the receiver was connected and tuned to the correct frequency, pictures were immediately seen. A little bit of left-right and up-down with the dish while observing the AGC of the receiver yielded studio quality video from Johns Hill to Mt. Worth on a frequency of 10.310 GHz.

### We Did It!

Considering the quality and strength of the received signal using the dish antennas, a second receiver using the small horn antenna was set up. Considerable difficulty was experienced in assembling a supporting camping table. Those devices are definitely not recommended for field use! Again, good signals were received although it became obvious that some polarity rotation of the signal had occurred over the path. This rotation was about 70-80 degrees. In reviewing this much later, it was determined that this was most likely caused by angular terrain in the foreground at Johns Hill and the possible heat path over it.

**Remember to  
leave a three  
second break  
between overs  
when using a  
repeater.**

Having sent video of a hastily drawn QSL, the direction of transmission was changed. This is accomplished by removing the LNC from the waveguide feed and attaching the transmitting Gunnplexer. The returned signal from Mt Worth to Johns Hill was received just as well over the path. For the next two and a half hours, signals were recorded to videotape and attenuators placed in the transmit feedline. Although the original power levels transmitted from the Gunnplexer were 30 milliwatts to the antenna, power reduction to less than one milliwatt still gave excellent pictures.

During the day, weather conditions were very clear and temperature of about 27 deg C. No unusual bending or ducting of the signals were observed as was any variation in rotation from the 70 to 80 degrees noted above. This was fortunate as a misunderstanding between the two sites had led to the two main antennas being mounted with their polarities at 90 degrees! It was claimed that this misunderstanding had something to do with the type of waveguide mounts used.

### Higher Frequencies

As the experiments on 10 GHz had proved extremely successful, consideration was given to exploring the possibilities of covering the 60 plus kilometres on an even higher frequency. No specific equipment had been taken for this possibility but some devices were found in the vehicles that would allow an attempt on about 500 THz (Terahertz!). A few minutes experimentation and reception of the letter S in morse was confirmed at Johns Hill. This contact was also recorded on videotape. Unfortunately conditions did not permit a two-way contact although it is believed that the Johns Hill group was not able to aim their transmitting antenna with sufficient accuracy. At the conclusion of these tests, the mirrors were re-fastened to their respective vehicles.

After a trip back from Mt. Worth, somewhat punctuated by various squeals of success from the driver, the meeting with the other party at Jim VK3ZYC's QTH relived through viewing the considerable amount of videotape taken, both on and off air at both sites. Consideration is now being given to finding other sites of even greater

separation in an effort to determine just how far video signals may be sent on this band. An overall "figure of merit" in excess of one billion for the contact was derived by multiplying the distance by the frequency and dividing by the power. A similar figure could also be derived from the enjoyment of the occasion!

As a result of our activity, others have expressed interest in this fascinating area of communication with relatively simple gear that has a lot to be discovered. Thanks are due to many others who, in some way, have contributed, either knowingly or not, to the success of the exercise. No doubt, the increase in availability of equipment as used, will lead to others enjoying the fun and excitement of "doing something different".

The cover photograph and photographs accompanying this article were kindly supplied by Peter Ford VK3TAF.

Complimentary colour processing was provided by BOND COLOUR LABORATORIES, Richmond Vic, for which we offer grateful thanks on behalf of our readers.

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# Product Review — The BAYCOM Packet Modem

By Gili Sones VK3AUI

**B**AYCOM HAVE produced a packet modem in a D9 plug which must be just about the most compact packet modem available. Even more impressive is the fact that it works brilliantly. The Serial Port provides the power supply and the radio just plugs into the DIN connector on the back of the modem.

Software to run the system is on a single disk. The system uses the PC to form up the packets and the modem is just to convert the serial port signals to and from audio. Because the modem is so small and simple there is enough power available from the serial port to run it.

This is a much simpler procedure than the usual TNC setup. A TNC usually is a dedicated computer and modem which converts serial data into Packet audio signals and incoming audio packets into serial data. Another program in the computer handles the serial data and looks after the TNC.

BAYCOM provide a software program which carries out the functions of both the usual packet program and the TNC. Only a relatively simple hardware modem is needed and the PC performs all the processing. A much neater solution.

My normal packet setup is a Paccomm Tiny 2 TNC and I use PAKET as the PC packet communications program. The PC is an XT clone.

After finding an adaptor from my 25 pin serial port to the 9 pin serial required for the BAYCOM I was ready to go. The software loaded easily and I set my callsign. The manual revealed that the 5 pin DIN connec-

tions were identical with those I had coming from my transceiver. The BAYCOM started and I connected to a local BBS.

Operation was simple with but a few glances at the book and some recourse to the on screen help. The software and the modem performed without a hiccup and were very simple to use. If it was your first attempt then some more recourse to the book and the help file would be in order.

For the beginner or the more experienced who want a simple to use and troublefree system I would recommend the BAYCOM. The small size and simplicity make portable or even handheld operation possible. A Laptop and a handheld together with the BAYCOM make a very compact and portable packet setup.

Just about any sort of PC should work. Some odd ones and PC emulations may be tricky but then users of such systems know the traps. The program is not memory hungry and can be run in the background if needed.

The instruction book has been produced locally and is easy to use. The original program is from Germany and the book has been translated. However it is easy to follow as it has been very carefully translated and is not like one of those manuals from the east.

In summary an elegant and simple packet modem and system which has much to recommend it.

The modem and software are available from the Australian Amateur Packet Radio Association 59 Westbrook Avenue Wahroonga NSW 2076.

The cost is \$190.

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# Amateur Radio and Electromagnetic Compatibility

## PART 1

H F Ruckert VK2AOU  
EMC Reporter  
25 Berrille Road  
Beverly Hills NSW 2209

**M**ORE THAN 70 EMC reports have been published in AR during the past 10 years. Most reports dealt with one or more subjects from local experience and information obtained from overseas amateur radio publications. Few readers will have kept a complete file of all of these publications in order to have the information at hand, should they experience an EMC problem themselves. Now may be the right time to compile a summary, highlighting minor subjects together under main headings.

### How old are EMC problems?

EMC problems are as old as radio communication itself. When more than two ships or land stations were using Marconi transmitters at the same time, QRM resulted. The lack of selectivity, using only tuned antenna length, was the reason. Prof Slaby (Germany) and others had to introduce the L-C tuned circuit in order to separate the various operations. That was about 100 years ago. About 70 years ago radio broadcasting and amateur radio operation began in many countries, and at the same time EMC problems were experienced, called BCI. When, about 50 years ago, TV broadcasting was introduced in many countries, the so-called TVI problems became a war between the radio amateur and his neighbours. With the proliferation of electrical and electronic appliances and services, electromagnetic compatibility became a world-wide problem,

which had to be dealt with by international regulations, or coexistence of many operations would have been disturbed.

### What has been done by those concerned?

The EMC problem is worse in densely populated countries with a large radio amateur population. It is therefore not surprising that American amateurs first tried to help. P S Rand "Laboratory of Advanced Research" Remington Rand Inc, USA produced the famous book "Television Interference" with many contributions published in 1952-54. The writer had several long QSOs with Phil, and was grateful when Phil sent two copies of the TVI book. In West Germany it was mainly DL1BU, and later also DL9JTJ, who attacked the problems in association with the professional Electronic Engineers Associations (VDE and DIN) and the Government (FTZ). QST reported in November 1952 the "RFI Bill" PL97-259, introduced mainly by K7UGA (Senator Goldwater) which was a great step forward as soon as the President had signed the document into law. TVI committees in the UK also did a great job in helping the amateurs with a number of excellent publications. There are now EMC conferences alternately in Switzerland and Poland, where experts from many countries meet to exchange experiences and to plan action by their governments. Now the countries of the Euro-

pean Common Market are laying down standards for electromagnetic compatibility of many appliances and electronic entertainment equipment. The German radio amateur experts requested an immunity level of 10 volts per metre, supported by experts from Poland and elsewhere. The DIN/VDE standards offer only 3 v/m, which helps in most cases, provided the manufacturers adhere honestly to this level (so far, this has not always been the case). Now we hear that the EEC plans to water the standard even further down, because some manufacturers have not yet done their homework. But some standard is better than none at all, as at present in many countries. It is pleasing to see that some manufacturers (German and South Korean) are doing very much better than required at no extra cost! So, nobody can say it can not be done, or it costs too much. The large Common Market in Europe makes it uneconomical to produce, import and sell below-standard equipment, because the EEC can ban such equipment. "Banana Republics" with no EMC standards are likely to receive the sub-standard electronic entertainment equipment which may be left over.

### What is a "Disturbance", and what is "Interference"?

It is unfortunate that not only technically uneducated persons, but also radio amateurs, use the term "interference" when they are not to be blamed for EM incompatibility. Legal RF energy transmissions can never cause interference. The other term "disturbance" should be used, when legal RF radiation affects the operation of equipment which has insufficient immunity (selectivity) or any design fault making it incompatible with legal transmissions.

### Examples

A radio amateur hears on the 14 MHz band, every 16 kHz, an S-5 signal, which comes from his own TV receiver or the TV set of a neighbour. This is interference, because TV sets are supposed to be only receivers of signals, which are transmitted on allocated TV channels. They are not to be transmitters, operating on frequencies which belong to a different service. One can check the unwanted radiation from TV sets by using a transistor receiver

with a long-wave range (popular in Europe). This signal (oscillator harmonics) should disappear at a distance of one metre or less, or one could not operate a hi-fi receiver close to a TV set.

Arcing in power line installations, often observed after several days of dry weather, is another case of interference. Walking along the street with a portable radio, one can usually identify where the arcing comes from. The electrical supply service is usually co-operative, and appreciates, if known, which power pole appears to be the trouble-maker (the poles are numbered). These arcs interfere with TV reception (especially Channel 2) and short-wave reception.

A compatibility problem occurs between a clean fundamental frequency legal amateur transmission and the operation of a hi-fi receiver or a TV receiver, or a VCR. In all these cases we have a "disturbance" (not interference) due to design deficiencies causing a lack of immunity or selectivity, or being too susceptible. The equipment owner should make the manufacturer responsible. The receivers suffer mostly in these cases from front-end overload, or lack selectivity and the ability to handle strong out-of-channel signals. "Disturbance" means that the receiver is to be blamed (not the transmitter).

Should a transmitter radiate too strongly, harmonics which fall on a frequency allocated to a receiver service, then the transmitter operator is responsible. He has to improve his transmitter selectivity (suppressing harmonics) to an acceptable level, to overcome this case of "interference". By using the terms "disturbance" or "interference", one places automatically the responsibility to overcome the EMC problem on the guilty party. It is therefore undesirable to use always the term "interference", which can be quite wrong, and have legal consequences. (In German: Interferenz/Storende Beeinflussung). First, we must keep our own house in order.

When we intend to purchase an appliance (TV, VCR etc), it would help if we could find out from an amateur friend how well his appliances behave as far as EMC is concerned, noting make and models. There are substantial differences which often have nothing

to do with the price. It was revealed by the Consumer Association in Germany (Warentest: Tested wares) that the type approval number connected with EMC performance was not even a guarantee for meeting the test requirements. We are not likely to get a written guarantee from a sales manager to take the appliance back if it turns out to be impossible to improve the EMC rating and performance. EMC performance seems still to be a matter of luck. Some TV sets pack up at 0.1 V/m in the test cell, whilst other models from other manufacturers can take over 50 V/m. Not all have done their homework, but the EEC market will force some improvement to be made — we hope!

### EMC Test; the first job after obtaining or building a transmitter

We should not leave it to neighbours to find out what is being radiated along which path from our new transmitter (transceiver and/or amplifier). Instead, connect the transmitter via a short well shielded piece of coaxial cable to a shielded dummy load, and run the transmitter with a two-tone oscillator on phone or with dots on CW, using the maximum power the maker recommends. With an absorption frequency meter (Fig 1) or a dip meter (GDO) check the leaking RF along any attached cable (mains, power supply, mike, speaker, headphone, transverter, monitor-scope, computer etc) at the control knobs, dials, gaps between the chassis and the bottom cover or lid, and at attached SWR meters. An absorption type frequency meter (tuned LC circuit, Ge diode and 50  $\mu$ A meter can detect signals as low as 10-20 mV. A dipmeter also tuned to the transmitter fundamental and to the harmonics can do the same. Any attached cable showing this order of leakage will have to be wound through a ferrite core of suitable size using 10 or more turns. Low Q and high  $\mu$  ferrites like those used in TV line frequency transformers are suitable. Low pass filters, with high stop band attenuation at least to 500 MHz, should be attached directly to the transmitter output terminal (no coax cable between transmitter and filter). That is about all we can do with a manufactured transmitter (transceiver

plus final amplifier), hoping the manufacturer did his part.

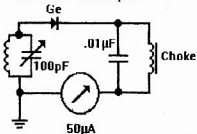


Figure 1 — Absorption Type Frequency Meter

Those of us who are not only "appliance operators" but "radio amateurs" in the original sense can do as much as the technology provides. The high RF power carrying components should be either confined by an unpainted perforated metal box on top of the chassis, or the cabinet internal edges should be unpainted (front panel, bottom and top cover and chassis) and a sufficient number of screws must be used to avoid RF leakage at the cabinet edges. The higher the frequency, the closer must the screws be placed to seal the cabinet (3 cm at 435 MHz).

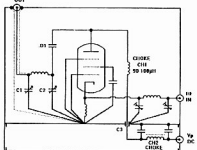
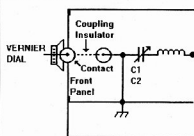


Figure 2 — Earthing Point

The chassis floor and the front panel must not become part of the high RF current carrying path from the valve or the Pi filter components (Fig 2) or shielding becomes impossible. These components should be interconnected by wide copper strips and not by thin wires (reducing the unwanted circuit inductance).

Fig 3 shows how a vernier dial can be attached to the Pi filter variable capacitors C1 and C2. An insulating flexible coupling should be used to prevent high RF voltage from the capacitor feeding through the front panel to the vernier dial, making it "hot" (ie leaking RF power). The RF choke Ch 1, should have 90  $\mu$ H inductance and



**Figure 3 — Vernier Dial Connection**

must be wound on a coil former of low RF loss material like steatite ceramic. Plastic material which could melt when warm, or has high RF losses, could cause serious problems. RF chokes of the Christmas tree type can also cause difficulties, because each coil has its own parallel and series resonances, making the choke ineffective perhaps at a desired operating frequency. A 90  $\mu$ H single layer choke wound on 2-3 cm diameter former works fine from 3 to 30 MHz. Fig 2 shows choke Ch 2, because it has been found that choke Ch 1 and the feed-through capacitor on the chassis still allow too much RF to escape at the Vp terminal, when a separate HT power supply is connected via a cable to the amplifier. This choke is wound on a low Q ferrite rod of 12 mm diameter and 20 cm length, using 30 turns. C4 is one more bypass capacitor. These are some fundamental considerations the home constructor should not forget.

### How well does the industry deal with the problem of RF leakage?

DLIBU published a very detailed paper in "CQ-DL" magazine No 12/1982 testing several popular commercial power amplifiers with calibrated professional equipment. The table (Fig 4) shows the relationship of watts, dB above 1pW ( $\text{pW} = \text{picowatt} = 10^{-12}$  watt), terminal voltage across 50 ohm and dB above 1  $\mu$ V.

The regulations require the reduction of harmonics by 40 dB for transmitters of over 25 watt, operating on short waves, and 60 dB reduction is called for VHF/UHF transmitters. A 100 W transmitter operating on short waves is allowed to have 10 mW and a VHF transmitter 0.1 mW of harmonic power at a 50 ohm dummy load. The operating regulations require very severe

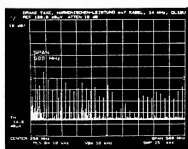
| WATT                | dB above 1 mW | Volts       | dB above 1 $\mu$ V | V (measured across 50 $\Omega$ ) |
|---------------------|---------------|-------------|--------------------|----------------------------------|
| 10 <sup>0</sup> W   | + 60 dBm      | 1 kW        | 150 dB $\mu$ mV    | 300V = 110 dB $\mu$ V            |
| 10 <sup>1</sup> "   | + 50 dBm      | 100 W       | 140 dB $\mu$ mV    | 100 V = 100 dB $\mu$ V           |
| 10 <sup>2</sup> "   | + 40 dBm      | 10 W        | 130 dB $\mu$ mV    | 30 V = 90 dB $\mu$ V             |
| 10 <sup>3</sup> W   | + 30 dBm      | 1 Watt      | 120 dB $\mu$ mV    | 10 V = 80 dB $\mu$ V             |
| 10 <sup>4</sup> "   | + 20 dBm      | 100 mW      | 110 dB $\mu$ mV    | 3 V = 70 dB $\mu$ V              |
| 10 <sup>5</sup> "   | + 10 dBm      | 10 mW       | 100 dB $\mu$ mV    | 1 V = 60 dB $\mu$ V              |
| 10 <sup>6</sup> "   | 0 dBm         | 1 mW        | 90 dB $\mu$ mV     | 300mV = 50 dB $\mu$ V            |
| 10 <sup>7</sup> "   | - 10 dBm      | 100 $\mu$ W | 80 dB $\mu$ mV     | 100mV = 40 dB $\mu$ V            |
| 10 <sup>8</sup> "   | - 20 dBm      | 10 $\mu$ W  | 70 dB $\mu$ mV     | 30 mV = 30 dB $\mu$ V            |
| 10 <sup>9</sup> "   | - 30 dBm      | 1 $\mu$ W   | 60 dB $\mu$ mV     | 10 mV = 20 dB $\mu$ V            |
| 10 <sup>10</sup> "  | - 40 dBm      | 100 nW      | 50 dB $\mu$ mV     | 3 mV = 10 dB $\mu$ V             |
| 10 <sup>11</sup> "  | - 50 dBm      | 10 nW       | 40 dB $\mu$ mV     | 1 mV = 0 dB $\mu$ V              |
| 10 <sup>12</sup> "  | - 60 dBm      | 1 nW        | 30 dB $\mu$ mV     | 300 $\mu$ V = -10 dB $\mu$ V     |
| 10 <sup>-13</sup> W | - 70 dBm      | 100 pW      | 20 dB $\mu$ mV     | 100 $\mu$ V = -20 dB $\mu$ V     |
| 10 <sup>-14</sup> " | - 80 dBm      | 10 pW       | 10 dB $\mu$ mV     | 30 $\mu$ V = -30 dB $\mu$ V      |
| 10 <sup>-15</sup> " | - 90 dBm      | 1 pW        | 0 dB $\mu$ mV      | 10 $\mu$ V = -40 dB $\mu$ V      |
| 10 <sup>-16</sup> " | - 100 dBm     | 100 fW      | -10 dB $\mu$ mV    | 3 $\mu$ V = -50 dB $\mu$ V       |
| 10 <sup>-17</sup> " | - 110 dBm     | 10 fW       | -20 dB $\mu$ mV    | 1 $\mu$ V = -60 dB $\mu$ V       |
| 10 <sup>-18</sup> " | - 120 dBm     | 1 fW        | -30 dB $\mu$ mV    | 300 nV = -70 dB $\mu$ V          |
| 10 <sup>-19</sup> " | - 130 dBm     | 0.1 nW      | -40 dB $\mu$ mV    | 100 nV = -80 dB $\mu$ V          |
| 10 <sup>-20</sup> " | - 140 dBm     | 0.01 nW     | -50 dB $\mu$ mV    | 30 nV = -90 dB $\mu$ V           |
| 10 <sup>-21</sup> W | - 150 dBm     | 0.001 nW    | -60 dB $\mu$ mV    | 10 nV = -100 dB $\mu$ V          |

**Figure 4 — Power Comparison Table**

harmonic power level reductions if TVI has been caused by transmitter harmonics. Now the harmonic level must be reduced to  $1.25 \times 10^9$  watt = 1.25 nanowatt. The level of 1.25 nanowatt is also 31 dB above 1 picowatt. At a 50 ohm dummy load this power level gives 250  $\mu$ V (microvolt). In the case of a 100 watt transmitter the level amounts to 140 dB (pW) or 71 volt at 50 ohm. A 40 dB harmonic reduction is no longer good enough, and we have now 140-31 = 109 dB. A power amplifier running 750 watts requires a harmonic reduction of 118 dB, which takes some doing!

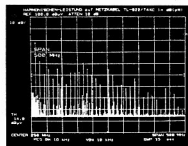
A well designed low pass filter could provide the required harmonic reduction if the filter is directly attached to the amplifier cabinet, provided the cabinet and the attached cables (from power supply, mike, key, monitor scope, SWR indicator) are practically free of RF and not leaking. The spectrum analyser photos show what we can expect from commercial RF power amplifiers.

Fig 5 shows the level of RF power measured at the cable which connects the Drake T4XC transmitter to the separate power supply. The fundamental and harmonics over 500 MHz are shown, when the transmitter was operated at 14 MHz.



**Figure 5 — Refer Text**

Fig 6 shows what happens when the power amplifier TL-922 is driven by the T4XC and a two-element quad antenna is used. The amplifier adds 8 dB of power increase to 78 dB (pW). A similar result, only 10 dB lower, was found when the measurement was carried out at the coaxial antenna cable near the transmitter. It shows that with this level of leaked RF outside the feeder coaxial cable, an added low-pass filter cannot improve the harmonic radiation to any marked degree. Under these conditions the antenna practically no longer radiates harmonics, but the antenna cable and transmitter cabinet do.



**Figure 6 — Refer Text**

Fig 7 shows what happens in the case of a transistorised amplifier IC-701, operating with 100 watts at 28 MHz. The harmonic power level measured at the connecting cable to the separate power supply is between 40 and 60 dB around the 200 MHz TV band; this means 50 dB (pW). This leakage power is also found on the cabinet and antenna cable. Similar results were measured on the amplifier L4B running 700 watts on 21 and 28 MHz. My own experience with the HL12U 435 MHz amplifier confirmed that plenty of RF is at the cable to the power supply and also the heat-sink-case (being anodised) does not make any contact with the bottom plate, so leaks RF.



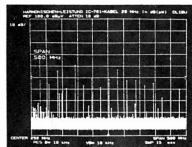


Figure 7 — Refer Text

Experience shows that it does not help to place a low-pass filter between the transceiver-driver and the power amplifier. The PA generates all the harmonics regardless of an additional filter. If the transmitter cabinet itself does not radiate substantial harmonics already, it could help to place two low-pass filters in series directly at the PA output terminal.

(to be continued)  
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# Technical Abstracts

Gil Sones VK3AUI

## Getting The Low Down

**N**EW ZEALAND amateurs have an allocation from 165 kHz to 190 kHz and have been conducting interesting experiments there. The band presents many challenges with the antenna system being the major hurdle. Equipment also represents a challenge as it must be home brewed. Receiving is possible with many amateur transceivers but the provision of coverage is just an afterthought to the makers.

Locally John Adcock VK3ACA has been experimenting for some time and has an experimental licence. The experimental licence callsign is AX3T35. The frequency allocated and used by John is 196 kHz.

Recently John VK3ACA has been assisted in conducting test transmissions on 196 kHz by Don VK3BDJ. The tests have consisted of a series of transmissions from Don's QTH at Gordon near Ballarat. These transmissions have been heard in New Zealand and interstate.

Antenna efficiency is a major problem at these low frequencies. Noise is also a problem as many switching power supplies and other devices have outputs in the region.

In New Zealand tests have taken place on 166 kHz and 181 kHz. These

frequencies being chosen to suit the scene in New Zealand.

Use of 166 kHz presents some problems as the third harmonic must be very well suppressed to avoid interference to 500 kHz which is an important marine frequency. To achieve this Andrew Corney ZL2BBJ built and published the design of a low pass filter in Break In August 1992. The design is for transmitting but for receiving it would minimise Broadcast station breakthrough and lower rating components could be used.

The filter is shown in Fig 1. The 3 dB point is at 254 kHz and it is better than 50 dB down at 500 kHz. The original used pot cores and 500 V capacitors to handle 100 W of RF. For receiving small ferrite toroids or even RF chokes and small "Styroseal" capacitors will suffice.

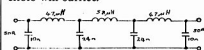


Fig 1 Low pass Filter -3 dB at 254 kHz

Receiving Low Frequency can be a problem but a simple converter can be used to allow the use of an HF receiver as an IF. Andrew Corney ZL2BBJ has designed a suitable converter which was published in Break In September 1992.

The converter uses an old 2 gang broadcast variable capacitor together

with an FET, an NE602 IC and a crystal plus a few incidental components to shift the LF signals to the 80 metre region. The coils used could be small RF chokes. See Fig 2 (on p 16) for the circuit.

If the FET tends to oscillate try a 2n2 capacitor across the 680 ohm source resistor.

The output transformer is wound on a TV balun core. An FT50-43 toroid could be used if desired.

The crystal used can be anything which gives a suitable IF in the region of the 80 metre band. For example a 4 MHz computer crystal will tune backwards in the 3.8 to 3.9 MHz region. A 3.579 colour crystal will work but calibration will require some mental gymnastics.

For those needing other circuits and details of loops then the articles in AR by Lloyd Butler VK5BR are a good start.

## UHF Collinear Antenna

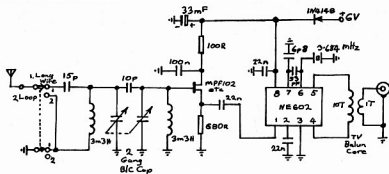
From near the bottom of the spectrum we now go to a couple of stops from the top. A 28 element design for 2.4 GHz was published in the JA magazine The Radio Amateurs Magazine in their August 1992 issue. The author was JA7YTB.

The design is interesting in that 5/8 wavelength elements and 3/4 wavelength elements are used. The feed is the old Zepp feed also used in the J-pole and Slim Jim designs. However the end feeding of so many sections is quite a feat.

The design is shown in Fig 3. The antenna would appear to have been bent up out of a length of rod or wire and then slid into a fibreglass tube radome for support. SWR could be adjusted by the relative spacing of the quarter wave matching section or the diameter of the quarter wave spike.

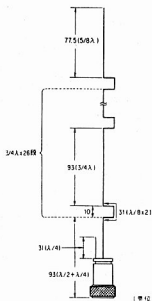
Scaling the design to both 1296 MHz and 432 MHz should be possible. Reducing the number of collinear sections should also be possible and may also make it easier to achieve a gain figure consistent with the number of sections. I well remember at antenna gain contests that some Yagi builders got more gain from only half their monster antenna than from the full monster. A graphic demonstration of diminishing returns.

With large collinears the problem to be overcome is to excite the whole an-

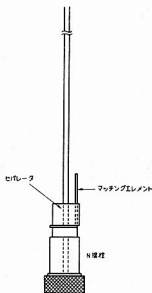


tenna. If the end has only a fraction of the power fed to elements nearer to the feed both gain and pattern suffer.

In any event JA7YTB has produced an interesting design which could be the basis for many experiments.



第1図 破壊したアンテナの構造



第2回 読者の選考

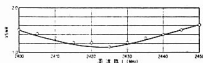


图 3-2 理想化的 V-S 特性

**Fig 3 28 Element Collinear**

### Microphone RFI

RF feedback has been experienced by some users of desk microphones. These microphones often contain a preamplifier and this is often where the problem lies.

Multiple DC and control lines to the microphone for PTT and other functions can also pick up and couple RF into the microphone amplifier.

A shack hot with RF is a prime cause of trouble and should be tackled first.

A good and efficient earth is an excellent first step. If your earth is still at some RF potential at the rig, other measures may be needed. To bring the equipment to RF ground you can attach to the rig grounding point a series of quarter wave wires for all the bands in use. The wires are run around the room around the skirting or under carpets. Do not let any one touch the ends as they could be at a high RF potential.

For those still experiencing difficulties then a series of articles and items in QST may help. The original article was in QST May 1988 and was followed by Tech Correspondence in March 1992 and Hints and Kinks in July 1992.

Microphones suppressed successfully were an ICOM IC-SM6 and a Kenwood MC-80 together with a homebrew microphone project.

Principally the cures involved bypassing all wires entering the mic. In particular the PTT lines and the DC supply. Internally beads and RF chokes were also used.

RF chokes and ferrite beads were used to filter supply lines together with added bypasses. Audio leads must be treated carefully so as not to affect the audio frequency response or risk inducing hum. Toroids should be used in preference to solenoid style chokes to avoid inducing hum. Similarly RF bypasses in audio leads are a tradeoff between RFI and frequency response.

The QST references are a good guide for anyone faced with the problem. Particularly if it is in either of the two microphones mentioned. Remember that reducing the RF in the shack is the first step even if it is not a complete cure.

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## Mini Equipment Review

# The MFJ-247 SWR analyser with LCD frequency counter

Ron Fisher VK3OM

IN THE MARCH 1992 issue of *Amateur Radio*, I reviewed the MFJ-207 SWR analyser. At the conclusion of that review, I mentioned that MFJ would soon be releasing an upgraded version which would incorporate an LCD digital readout. The MFJ-247 is that model. The digital readout can be used in two ways. Firstly, it will read the frequency to which the internal oscillator of the SWR analyser is tuned, but it can also be used as an external frequency counter which is useable up to 150 MHz.

However, for those who haven't got the original MFJ-207 review handy, let's take a quick look at just what an SWR analyser does. The oscillator in the analyser is actually a low-power transmitter which is connected to the antenna, the feedline, the ATU, or a combination of all three, to determine if a 50-ohm match exists. A bridge circuit is coupled to the front panel meter which is calibrated in SWR at the following points: 1, 1.2, 1.5, 1.7, 2, 2.5 and 3, which is at about three-quarter scale on a scale length of about 25mm.

The frequency range of 1.8 to 30 MHz is covered in five ranges, as is the MFJ-207, but where the latter offered full coverage between these frequencies, the MFJ-247 has a few gaps. The actual coverage is 1.8 to 2.9, 3.2 to 5.3, 6.5 to 11, 12 to 21 and 18 to 30 MHz. In actual practice there is some slight extension on this coverage both above and below these frequencies. However, it could be a limiting factor for commercial users trying to tune an antenna on an RFDS channel in the 5.5 MHz region.

With the counter built in, the 247 is slightly larger than the 207. It is 101mm wide as against 63mm for the 207. At



The MFJ Model MFJ 247 Antenna Analyser — Front View.

the same time, the depth is actually 12mm less. External connections are an SO-239 to connect to the antenna under test, a BNC connector for external input to the frequency counter, and an external DC power input which is still not labelled for polarity. Internal battery power has been changed from a

nine-volt transistor type battery to six AA cells. It's still necessary to remove eight screws to put new batteries in. Current drain is about 170mA, so the use of alkaline batteries as recommended by MFJ would certainly be a good idea.

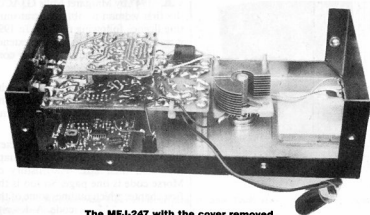
### The MFJ-247 in operation

I put the 247 into use with the several HF antennas available around the shack, and the results were most interesting. The frequency counter allows you to set the analyser to your exact operating frequency. However, I found that, in most cases, the analyser gave very different measurements from normal in-line SWR meters. The analyser will get you in the ball park, but you will still need your normal SWR meter to get your antenna tuned to your operating frequency. The frequency counter itself is a rather nice unit. With a whip antenna connected to the BNC input, and the counter input selected to external, I could easily read the frequency of my two-metre equipment. The error at two metres was about 1.5 kHz, but I expect the counter time base could be adjusted to put this right.

The Instruction Manual does not mention that the time base uses a 10 MHz crystal with .01, .1, 1, and 10-second gate times, but these points are covered in the advertising brochure.

Instructions on the use of the analyser are good. You won't have any trouble here except in trying to determine the polarity of the external DC input; however, I will let you into a secret. The tip of the plug is positive.

After a bit of use, I noted a few strange quirks with the 247. Occasion-



The MFJ-247 with the cover removed.



Rear View of the MFJ-247.

ally, the counter would lock up and refuse to read the operating frequency of the analyser. The only way to overcome this was to switch off and start again. The first review sample was quite bad in this respect, so I exchanged it for a second one which was much better.

Also, MFJ has dropped the vernier from the tuning control on this version. I feel that a six-to-one drive would provide much smoother control.

### The MFJ-247 conclusions

I would have to say that MFJ has a great idea here. However it is let down by a few details that could be easily corrected with little or no extra expense. The instruction manual should have more information on the counter operation.

Even so, I would like one for my shack, and at a retail price of \$409.20 it would have to be good value.

Our MFJ-247 was supplied by Stewart Electronic Components, 44 Stafford Street, Huntingdale, Victoria 3166.

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## BOOK REVIEW

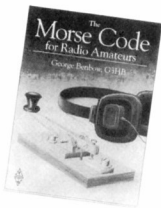
# The Morse Code for Radio Amateurs

Seventh Edition

Edited by George Benbow G3HB

Published by the Radio Society of Great Britain (RSGB)

Reviewed by Evan Jarman VK3ANI



**T**HE MORSE CODE for Radio Amateurs was first written in 1947 by Margaret Mills G3ACC; the first woman to obtain a transmitting licence following the war. In 1991 it was revised and had its scope extended although the majority of the content is still practice exercises.

This book was written for those who have no experience of Morse code and are seeking to pass the amateur examination.

The chapters that are not code exercises are limited in their scope perhaps to match their size. The history of Morse code is one page. So too is the first chapter which outlines some of the advantages of Morse code. A descrip-

tion of the Morse key does slightly better. It acknowledges the American straight key but prefers the solid arm GPO type of key. It includes a schematic circuit for a practice tone oscillator based on a 555 timer IC.

The last chapter on high speed Morse and automatic keys provides a better description, but is still information for newcomers to demonstrate what is available.

The chapter on the examination options applies to Britain and so should be ignored by Australians.

The sending exercises are where this book shines. It breaks up the alphabet and picks various letter groups to practise. Then having completed these groups, text using all letters is given. Finally numbers are added. Exercises also give the time required for transmitting at different speeds. The letter groups have been chosen using a common pattern in Morse. Also letters have been combined so that if spacings are not correct quite different letters or words will be heard, eg MIZMI becomes ZZZ.

These exercises would make good receiving practice. Words like REPEAT and REPENT will sort out any tendency to journalise before it could become a problem. The exercises form 13 of the 28 pages in this book and are worth every page.

No book can provide receiving practice which is the most basic skill in Morse code. It can only point out sources such as scheduled practice sessions on radio or recordings. Again this book is aimed at the British reader and only lists British sources.

The aim of the book is to interest people in the Morse code as a new and different language with which one can communicate world wide. I wish them well but feel that the book is too small to satisfy the interest generated.

There are many amateurs around the world who find it very relaxing and only wish that others could share this enjoyment. What must be the best example of Morse code operation to some is shown in an extract from the book. "In contact with an American amateur, he had commented on his Morse and the American replied that he was in an iron lung and keying the transmitter by blowing down a tube!"

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# More on Interference Cancelling, and a New Circuit

Lloyd Butler VK5BR  
18 Ottawa Ave  
Panorama SA 5041

## Introduction

IN A PREVIOUS article (AR September 1992) I described an interference cancelling system which operated by combining the signal from the main antenna with the signal from an auxiliary antenna. To achieve cancellation, the amplitude and phase of the auxiliary antenna signal was adjusted so that the interference components from the two antennas were cancelled by the combination.

The main complication in this type of system is the circuitry needed to adjust relative phase of the two signals over the complete range of 360 degrees. In the previous article, I submitted a circuit which made use of resistance-capacity (RC) phase shift networks to achieve this adjustment. The system as designed worked well, but the number of transistor circuit components needed to interface these networks turned out to be greater than I had first anticipated. This has led me to search for a simpler method of controlling the phase or at least one with less components.

I now introduce a new circuit which makes use of the phase shift that occurs when a tuned circuit is set off resonance. This gets back to the type of phase control used by Drew Diamond in his early circuit (AR, October 1976). However, Drew's circuit required the adjustment of a matching unit consisting of two variable capacitors and a rather large inductor on which taps

had to be set. Just how much phase was achievable by this circuit was also not defined. My new circuit, despite its simplicity, can be adjusted over a full 180 degrees of phase shift with a single tuning control. Of course, once this is achieved, the remaining 180 degrees is accessible by operating a phase reversing switch.

## The Phase control

In principle, phase adjustment is very simple. If a signal is loosely coupled into a parallel tuned circuit, the phase produced across the tuned circuit can be easily shifted over a 90-degree range as the circuit is tuned, from part-way down one side of the resonance curve, through resonance, to part-way down the other side. The effect can easily be demonstrated by loosely coupling a signal generator into a tuned circuit and simultaneously monitoring, with a dual trace CRO, the signal generator output and the signal across the tuned circuit. The precise amount of phase shift for a given frequency offset can be derived from the curves (Figure 1) reproduced from Terman.

To achieve 180 degrees of phase shift, we use two identical tuned circuits with their tuning capacitors ganged together. The two tuned circuits must be loosely coupled or separated by an amplifier isolating stage. The 90-degree shift in the second circuit is additive to that in the first circuit, giving us 180 degrees of range. Of course, the amplitude also varies across the resonance curve. In practice, this is no problem as the phase and amplitude controls have to be progressively adjusted, in turn, a number of times, until the interference null is achieved.

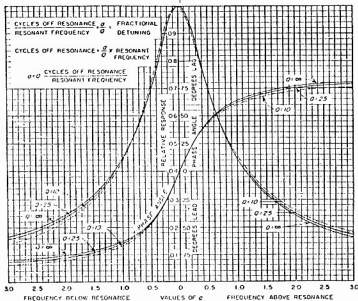
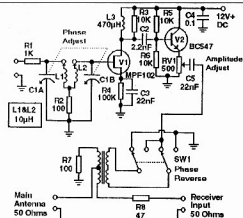


Figure 1 Resonance Curves Showing Phase Shift (from Electronic & Radio Engineering — Terman).



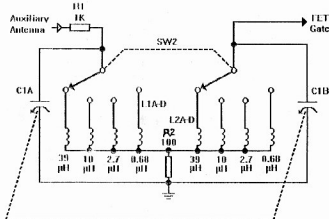
**Figure 2 Interference Cancelling Circuit**

**C1-2 Gang 15 to 280 pF, or similar**  
**L1, L2-Miniature RF Chokes 10  $\mu$ H tunes 3.5-7 MHz**

**T1-11 Turns quadfilar wound on Amidon  
ET50-75m Toroidal Core**

For the new circuit detail, refer to figure 2. In this diagram, L1-C1A and L2-C1B are the two tuned circuits coupled by resistor R2. Inductors L1 and L2 are identical and capacitors C1A and C1B are a ganged variable pair. In practice, tracking of tuning does not appear to be critical and hence there is no need to be too concerned about precision matching of the inductors. The circuit, as shown, runs with a fairly low Q, and almost any identical pair of inductors can be used provided they are selected with the right inductance for the frequency concerned. Matched aerial and RF coils from an old valve receiver can be put to good use here. In this case, the primary winding of the aerial coil can be used to couple the auxiliary antenna instead of using coupling resistor R1.

Inductors specified in figure 2 (and figure 3) are miniature RF chokes which can be purchased from electronic stores for about one dollar each. These are very convenient because they are no larger than a resistor or small capacitor, can be supplied in precise values of inductance and save the effort of having to wind the coils. The inductance value ( $10\ \mu\text{H}$ ) shown in figure 2 allows tuning between the 3.5 and 7 MHz bands. The resonant tuning range is greater than this, but a tuning overlap must be allowed for phase adjustment either side of resonance at the extreme ends of 3.5 and 7 MHz. For 1.8-3.5 MHz we can use 39  $\mu\text{H}$ , for 7-14 MHz—2.7  $\mu\text{H}$  and for 14-28 MHz—



### Figure 3 Band Switching

**39  $\mu$ H-1.8 to 3.5 MHz      10  $\mu$ H-3.5 to 7 MHz**  
**2.7  $\mu$ H-7 to 14 MHz      0.68  $\mu$ H-14 to 28 MHz**

0.68  $\mu$ H. If complete HF band coverage is required, a four-pole two-position switch can be used as shown in figure 3.

## Interface & Mixing

Two transistor stages follow the phase shift tuning system. FET stage V1 provides high input resistance to prevent loading of the tuned circuits and provides voltage gain which is needed in reserve in the system. Emitter follower stage V2 provides a low source resistance to drive the receiver input via the mixing circuit. Potentiometer RV1 is used to set amplitude in adjusting for interference null. The potentiometer must be a non-inductive type (not wire wound) with preferably a tapered resistance characteristic to improve adjustment resolution when set near minimum. If a tapered pot is not available and difficulty is experienced in adjusting near minimum setting, the gain of the amplifier can be reduced by reducing the value of resistor R3 or providing a switch to connect in a lower value. The final component in the phase control chain is switch SW1. This reverses the phase of the auxiliary signal to extend the 180 degrees of phase adjustment to 360 degrees.

The circuit around transformer T1 is similar to that used in my previous system. It is balanced so that minimal amplified auxiliary signal is fed to the main antenna. This is necessary to prevent feedback via the two antennas, and instability in the system. To simplify the circuit, the matching transform-

er feeding the 50 ohm receiver input in my previous system has been omitted and resistor R8 has been added to achieve the correct match, this adds an extra 3dB loss to the inherent 3dB loss already in the main antenna circuit and caused by the balancing system. On the HF bands, noise picked up by the antenna normally overrides receiver noise so that the total 6dB loss should not normally be a problem.

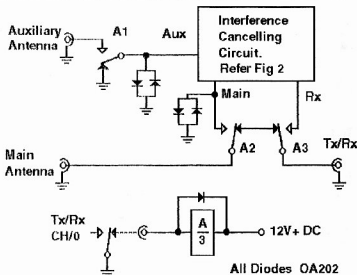
### Transmit-Receive Facility

For the DX listener, Figure 2 in conjunction with Figure 3 makes up a complete system. However, for amateur station use, extra circuitry is required to switch out and provide protection for the interference cancelling unit when transmitting. The switching and protection circuit shown in figure 4 is similar to that used in my previous system. This has again been included to make the article complete. Relay A is operated on transmit by normal contacts of the TX/RX relay in the transceiver. On transmit, relay contacts A2 and A3 switch out the balancing and mixing transformer and connect the transceiver direct to the main antenna. Relay contacts A1 disconnect the auxiliary antenna and earth the auxiliary input. Diodes across the interference cancelling input and output circuits provide additional surge protection.

### Merits of the New Circuit

Performance of the new unit is much the same as my previous unit, but it is





**Figure 4 Transmit-Receive Switching**

assembled with less components and has less controls to adjust to set up for interference null balance. In the previous system, the input tuning had to be peaked up, one of four phase quadrants had to be selected, and phase and amplitude controls had to be trimmed. In the new circuit, there is only a two-position phase reversal switch with phase and amplitude controls to be trimmed.

In the previous unit, a tuned input from the auxiliary antenna was found to be necessary to prevent cross modulation from local broadcast stations and other signals which caused "birdies". In the new unit, the input tuning system combines this function with phase control. While the tuning might be set a little off resonance, it still provides rejection of out-of-band signals.

To set for a balance, the phase and amplitude controls are adjusted for lowest noise, one after the other a number of times, until an interference null is achieved. If a null is not found, or the null is not very definite, the phase is reversed with the reversing switch and

the procedure repeated. For further details on the sort of results which can be achieved, I refer you to my previous article (reference 1).

### Summary

A new interference cancelling system, using circuit detuning for phase adjustment, has been described. It requires less components and, in operation, is easier to adjust than my previous system using RC phase shift circuits. If you have a local interference problem and are interested in a cancelling system, I suggest you give this circuit a try.

### References

1. Lloyd Butler VK5BR — An Interference Cancelling System for Your Receiver or Transceiver — Amateur Radio, September 1992.
2. Drew Diamond VK3XU — A Method of Reducing HV Power Line Noise — Amateur Radio, October 1976.

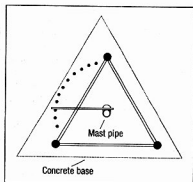
## Info on Rotators

12 Park Avenue  
Rosslyn Park SA 5072

**A**FTER THE TH6 went up, I had no rotator, so the rotator pipe was extended to the mast foundation, resting on a steel plate and sitting in a hole of a jarrah block, all bolted down. With two cyclone pipe fittings and two short lengths of suitable pipe, one was pinned down by a 1/2" U rod 9" long, the other acted as a pointer. Both pipes were able to turn inside the tower legs. When not in use, I slid a long smaller pipe inside one so the coax could not get wound up. My SH rotator has been in use four years, bolted to the foundation. I still use a pointer pipe, which is roped at times to take any strain off the rotator.

My 18/24 MHz two-el yagis at .075 spacing on one 8 ft boom has a 22' length of tube mast sitting inside a 6' length of 2" pipe. By slotting the top of 2" pipe four times, I slide in a short length of 1/2" rod. By lifting same with my hands, they give me LP and SP to Europe and America. As simple as that.

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**Fig 1 Top View of the tower depicting the manual rotation method.**

**Help stamp out stolen equipment — keep a record of all your equipment serial numbers in a safe place.**

# A Test Load for the 20 Amp Power Supply. Ideas for the Experimenter

How to get rid of around 300 watts. VK5BR has an answer.

Lloyd Butler VK5BR  
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Panorama SA 5041

A STANDARD POWER supply for many transceivers is 13.8 volts at a maximum load of 20 amps. Radio Amateurs often build their own 20 amp regulated power supplies and various designs for these have been described in past issues of *Amateur Radio* (References 1 and 2). My own version of such a supply based on these designs was recently assembled but a problem seemed to emerge. How does one test such a unit to ensure that it can safely deliver 20 amps and how does one check its regulation? What is required is a 0.7 ohm resistor which can dissipate 276 watts. Just where does one get one of these?

The solution was found in a coil of 16 SWG galvanized iron wire which was purchased from the local hardware shop for some other project around the home. The resistivity of iron is around eight times that of copper and 17.5 metres of this wire was measured to have a resistance of one ohm. I decided to start with one ohm so that the load current would initially be 13.8 amps. I was a little dubious about putting the full load on the supply until I had first had a look at temperature rise in the heat sinks at the lower power.

To check the value of wire resistance, a digital multimeter was used. This

gives a more precise reading than an analogue meter, although the latter could be used if read with care. In any case it is advisable to check the calibration of the instrument against several one ohm resistors which can normally be obtained from most electronic stores. Modern resistors can be relied upon to be very accurate (if operated well below their rated power). In measuring resistance the test leads were clamped tightly to the galvanized wire so that the joint did not add appreciable resistance error. Earth jointing connectors, used in power wiring, were put to good use for this purpose.

The galvanized iron wire was wound on a frame made from two 133 cm lengths of wood crossed at right angles (See Fig 1). Holes were drilled in each leg of the frame at various intervals and the wire was wound in a spiral through these holes until the wire ran out.

Mounting the wire test load on a frame made it more convenient to use adjacent to the test bench. I had considered running the wire down the back yard and back again or fitted to the back fence. There is nothing wrong with doing something like that, but I decided that it might be a nuisance if I needed to use the load for extended periods.

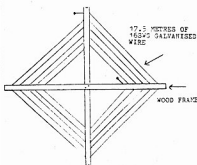


Figure 1 Test Load — 16 SWG wire wound on wood frames. 17.5 metres gives around 1 ohm. This can be tapped back to 0.7 ohm.

To connect the test load to the power supply, heavy copper wire leads were used so that negligible resistance was added by the connection. Of course the power connectors were again needed. For full load, the wire was ultimately tapped down to 0.7 ohm as measured at the end of the leads connecting to the power supply terminals. By measuring there, any connection resistance is included anyway.

At full load current of 20 amps, the dissipation in the wire is about 20 watts per metre (or .22 watts per cm) and the wire is just mildly warm. Of course a low temperature rise on load is important. Based on the temperature coefficient for soft iron, a rise in temperature of as much as 20 degrees centigrade would increase the resistance by 12%. The power supply worked out fine once I had corrected an instability fault which initially showed up at full load. Without the test load, the fault would not have been detected. Regulation was measured as 0.35% which I considered acceptable. The galvanized wire had done its job. Perhaps someone else needs to test a supply and can make use of this cheap and simple idea.

## References:

1. Denzil Roden VK2BXF — "The Even Simpler Regulator" — *Amateur Radio*, January 1980.
2. Des Greenham VK3CO — "13.8 V Regulated Power Supply" — *Amateur Radio*, May 1983.

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# The DSE Commander Mark 1 “Thoughts and Experiences”

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## Introduction

OVER THE PAST FEW years I have had a number of radio contacts via the local two-metre repeaters regarding people's problems in getting their Commander radios operational. The latest QSO was with Mike VK3ATB whose problems seemed to be similar to those that I had encountered. Evidently there was an emerging pattern of consistently occurring problem areas in this radio. I felt the experience that I had gained while finding solutions to the problems in my own set, and others that I had worked on could benefit other operators. I suspect there are DSE Commanders out there collecting dust which could well be fixed by using the additional information I have gathered.

In central west New South Wales a lot of interest has been shown in building this popular DSE kit. The earlier versions — Version 3, for instance — of these radios have worked better than the later versions — Version 6. If constructors had taken their time and followed the construction details methodically, fewer problems were experienced. However, final alignment was generally troublesome and I advise constructors who do not have access to basic test gear such as a CRO, frequency counter etc, to seek out somebody who is adequately equipped.

Walter Field VK2NNF decided on a bulk purchase of the kits for the local radio club provided I would carry out the alignment on any sets constructed. As things turned out, some kits showed a severe design fault, the solution to which removed any tendency of the same problem occurring in others. The modifications are numerous, but I believe they offer a worthwhile improvement to the performance of the radio. The aim of these modifications is to achieve a result which is stable and predictable.

All of the following modifications were applied to at least three radios to verify the results.

## Modifications

The Rx audio amp suffered various instabilities ranging from motorboating to added hiss. If your radio is an early kit (Q11 is BC337 and Q12 is BC327) then you may not have experienced this problem. The later kits substituted BC639 for Q11 and BC640 for Q12. A stabilising network consisting of a capacitor and resistor in series is usually connected to the output of IC audio amps. Adding a series network of a 47 nF capacitor and a 2.7 ohm resistor connected to the output of the audio amp is useful in eliminating troublesome supersonic oscillations. The component values are not

critical in this application, but be sure to keep the leads reasonably short. I connected this network underneath the PCB from the junction of R47, R48 to ground.

The Tx audio had been noticed to be somewhat thin, with a lack of the lower frequencies below 1000 Hz, as well as exhibiting overall general distortion. I altered the Tx audio frequency response to be 6 dB down at 300 Hz by changing C57 from 2.2 nF to a 5.6 nF greencap. The main cause of the audio distortion is severe peak clipping in the audio clipper. The problem may be caused by the supplied Carol microphone having a higher sensitivity than originally intended, or else by my habit of talking more loudly into the microphone than is really necessary. A 1 K $\Omega$  resistor in series with the microphone signal wire will reduce the microphone sensitivity and loading. The feedback pair mic amp has a low input impedance. Also a bias error was causing negative clipping before the audio clipper. If you change R53 from 560 to 680 ohms, the collector of Q14 will go from 2.5 to 4V DC, and this clipping will not occur.

The heatsink of the Tx Driver Q21 runs very hot — MUCH TOO HOT! Paul Bell VK1BX suggested this situation arises from excessive drive as indicated by high collector current. The collector current of Q21 is high and sometimes it exceeds the manufacturer's maximum value of 400 mA. I have had one case of a blown driver, and another where the pcb was badly scorched. The easiest way to reduce the drive is by removing C88. This will result in a more reasonable current of 250 mA and a cooler heatsink. After reducing the drive, the power output is now low, but it can be restored by making the following changes: Rewind L23 onto a 17/64" drill bit and L26 onto a 13/32" drill bit using the same wire type and the number of turns as specified with the original kit. The change in size of L23 will result in a better match between the driver and the PA stage. Altering the size of L26 causes a change in output power, so I tried variations in coil size until maximum output power was achieved. Replace RFC5 and RFC6 with chokes similar to RFC3 and you will pick up one watt in each case. Later kits have added L31

and C175 to reduce Tx harmonics. I found the extra filtering was causing a loss of two watts of output power. I didn't determine if the filter was too low in frequency or if L31 has wire which is too thin for the job. Try L31 with thicker wire, but avoid using tinned copper wire. Enamelled copper wire has lower losses in RF circuits (the enamel keeps the wire surface shiny) and is nearly as good as silver-plated wire. In my situation in the bush I returned to the original early kits and left out L31 and C157.

After a few years of use, my Commander's voltage regulator Q1, Q2 would not turn on. It relies on a leakage path created by R1. This is a sloppy start-up circuit. A sure-fire circuit can be incorporated by connecting a series combination of a 4.7 K and 1 K resistor from the emitter of Q1 to ground. From the junction of the added resistors a diode (1N4148) goes to the base of Q2 with the cathode end towards the base. Remove R1 from the circuit.

The most difficult problem I encountered was in a radio owned by George VK2GAW. The carrier was okay, but in use as the Tx stages warmed up an additional modulation would occur which ranged from geiger counter like clicks to a severe roar which would mask the voice modulation. I have seen other radios with this problem to a lesser extent which only have the clicking symptom. The effect is more severe if the antenna has an SWR mismatch. I stumbled across the fact that a 10:1 CRO probe connected to most places on the radio circuitry would show up a 20 MHz trace on the CRO. The phantom oscillation would drop out if L9 was detuned, giving little output power with this situation. This discovery clearly demonstrated the problem. Cutting the wire link between L29 and C126 (the Rx input from the LPF) made the Tx stable. Altering the input tap on the L2 tuned circuit by altering the ratio of C123/C124 also had the same effect. The fix is common to both transmit and Rx RF amp instabilities.

Another major problem can be a tendency for the Rx RF Amp (Q6) to readily break into oscillation. I initially lived with this problem by slightly detuning the coils around the RF amp, but while investigating the above TX instability I was forced to modify the

tuning capacitors across L2. This renders the Rx RF amplifier totally unstable because of the higher circuit gain by reducing the damping on L6 and the subsequent Q increase of the tuned circuit. A new RX RF amp retaining the BFY90 transistor was designed, which still maintains the original RX sensitivity and adds improved front end selectivity. The details of this new Rx RF amp are as follows:

Remove R12, R13, R15, C13  
Change C123 from 22pF to 6.8 pF  
All of the following modifications are made to the underside of the PCB using physically small components and the shortest path:  
Connect a 12 pF capacity across L2 primary.

Connect the emitter of Q6 to ground.

Connect a 100 K resistor between the collector and the base of Q6.

Connect a 1 K resistor from collector of Q6 to the cold end of L3 primary.

Connect a 47 pF disc ceramic from collector of Q6 to ground.

Connect a 18 pF disc ceramic from the collector of Q6 to the hot end of L3 primary.

For lowest noise figure the collector current of Q6 has been set at 2 mA as indicated by a two-volt drop across the 1 K collector resistor. The circuit sta-

bility and selectivity are enhanced by tapping the antenna feed down the primary of L2 and tapping the collector of Q6 down the primary of L3. It should be noted that the ferrite bead on the emitter of Q6 is now not needed, but if convenient, can be left in circuit.

A useful added feature is to have a switched power of 1 or 10 watts. This is achieved by adding a resistor in series with the DC feed to the driver (Q21) and PA (Q22). The place I'm referring to is called "UNSWITCHED PA + 13V8" on the circuit diagram. Cut the relevant track on the pcb, install a 10 ohm 10 W resistor onto the back panel near the PA heatsink and install a C&K style miniature toggle switch on the back panel near the incoming dc wires. For 10 watts the resistor is shorted out by the switch, while for one watt output the resistor is in circuit.

## Conclusions

The modifications outlined will result in a radio which has Tx and Rx audio quality, which is excellent, especially with a larger speaker.

Acknowledgment to Peter VK2MLG for preparing this document.

Reference: Electronics Australia, June and July 1984.

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# An Approach to Television Interference Control

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## Introduction

**A** PART FROM THE basic and obvious technical matters, there are a great number of other matters which must be addressed before you can even contemplate a solution to the technical problems that may or may not exist. Your recognition of these problems and your initial approach to them may have a profound effect on your relationship with your neighbours for a very long period. The first thing to recognise is that a potentially serious conflict is already in existence when you are first made aware that your neighbours are suffering some form of interference. As each person and family is different, your reaction will have to be carefully considered and calculated.

## Initial Contact

When you are first contacted by a neighbour and advised by him that he is suffering interference to his television reception, you must first determine whether or not the interference is caused by your station. In the first place, you should ask him or her the nature of the problem and under what circumstances it has been observed.

If it was apparent when you were away from holidays, it is unlikely to be your problem. He may not see it that way and may proceed to attack you absolutely mercilessly. Ask him to show

you the problem. If it is there when you are not transmitting you may wish to bring this to his attention. But beware that not all members of the public are as well educated as you are, and to them the mere presence of all that electronic gear may be frightening to them. Also be aware that, from their point of view, their TV receiving system is second to none in existence and could not under any circumstances be at fault or wanting in any way. Ignorance and superstition begin to appear as your prime enemies.

You may find that the complaint relates to a general decline in the ability to receive all channels, poor reception on one or two channels or problems with ghosting etc. Have a good look at his TV antenna and feedline etc. Corrosion in contacts at connectors, splitters, amplifiers etc will significantly reduced his received signal and make his set more susceptible to interference from your and other stations. If his antenna is old or dilapidated you may consider drawing this to his attention. Bent and missing elements do little to improve reception.

On the other hand, you may find that the complaint may relate directly to interference from your station. Remember that you are already in a situation where a potentially seriously conflict exists. Remember that our society is becoming increasingly litigious and that once lawyers are involved it is

most unlikely that normal relations can be restored. It would appear that some lawyers are not good at dispute resolution and may even have a vested interest in maintaining the conflict. Be ever so cautious in anything you say or do in order that you do not offend your neighbour or make any admission which could prove embarrassing to you in the future.

## Initial Testing

Where it becomes necessary to carry out some tests, make sure that all your low-pass filters are installed and that your antennas are perfectly tuned. You do not under any circumstances want him to see anything that is in any way a temporary aberration of your station as he will want to believe that you do that all the time. Remember that he is not technically inclined and most probably does not understand the experimental nature of the hobby.

Where you suspect a particular band (like six metres) to be at fault you may consider making some preparations to attenuate the offending signal at his TV. If you run a test and your rig wipes his TV out completely, you may be able to save the day by having a filter or trap available to demonstrate (hopefully) that the problem is at least controllable. Remember the moment you cause any deviation from normal during a test you stand accused and you are seen as the sole cause of his interference to the complete exclusion of all other services. If you can fix it for him on the spot you may stand a good chance of parting as friends as the aim of the exercise is peaceful coexistence.

Should you find or suspect that your transmitter may in some way be at fault, you must cease operation immediately and not recommence until the fault has been completely rectified.

## Interference Suppression

There are quite a number of possible causes of interference to television receiving systems. Should you find yourself confronted with a problem, it is suggested you seek information and guidance from others before you proceed to physical implementation of any proposed scheme. It is strongly recommended that you obtain a copy of the "Radio Frequency Interference Hand-

book" published by and available from the Department of Transport and Communications.

Start by reading it from cover to cover. Then re-read the more relevant sections. Your WIA Division will also attempt to help and may have a selection of designs for, and examples of, suppression devices which are both cheap and effective.

From the point of view of a first attempt solution, if the problem is suffered by a very close neighbour, the problem may be front-end overload of his receiver. The easiest solution may be the installation of an effective high pass filter. Should the problem be associated with only one band, the solution may lie in the installation of a trap on that frequency. The trap should be manufactured for the particular band or frequency in question and should be fitted with plugs so it can simply be plugged into the back of the TV and the antenna cable plugged into the trap. Nice and easy, and the complainant can be asked to plug it in himself.

If the high pass filter or band trap approach proves ineffective, you may find that a potentially more serious problem may be emerging. Be wary, you will require the detail and willing participation of your neighbour. If you cannot get his co-operation, you have a major problem, as you will need to delve further into his system. You will need the wisdom of Solomon and the patience of Job.

Some of the possible causes and some suggested solutions are set out below:

- 1) RF travelling down the outside of the TV antenna coaxial cable. Try winding the coaxial antenna cable around a piece of ferrite rod and taping it into position. Alternatively, the same coax may be wound onto a ferrite toroid. Both have the effect of choking out the radio frequency energy which may be travelling down the exterior of the cable. These methods do not attenuate the desired signal which is supposed to be travelling down the inside of the coax. Be careful not to kink the coax as this may change the impedance and attenuate the received signal.
- 2) RF radiated by your antenna may be collected by the street mains or by the house wiring in your neigh-

bour's house, and may be entering his TV set along the power cord. Again try winding the power cable around a ferrite rod or through a ferrite toroid. If this is not successful or produces only limited suppression of the problem, you should consider a commercial mains power filter. These are becoming readily available, and are not expensive. They are usually used in conjunction with a home computer.

- 3) RF picked up by the inner circuitry of the TV set. You have a problem. The chances are that your neighbour is not going to let you line the innards of his pride and joy with aluminium foil, and if he did, it may not work anyway. The real solution is to stop radiating into his TV. Try moving your antenna or redirecting the major lobe away from his TV set. The most satisfactory solution is to upgrade your antenna system and stick it up on a tower well above the susceptible TV, and possibly well above his antenna, too. There is not much else you can do.

### Who Is Going to Pay for all This?

The question of who is going to pay for all of this is a moot point. Theoretically, each person is responsible for the rectification or modification of his own equipment. However, you must remember that you are officially at war (either declared or undeclared) with your neighbour, and there may be some sacrifices to be made in the interests of a lasting peace. On the other hand, you must be aware that some precedents may be established that you would rather not establish. In order that you get back on air, it may be expedient to purchase the equipment and install it at your own cost. That may be okay for one house, but may become totally unacceptable for the whole street. An option may be to lend the gear to the neighbour pending his later upgrading of the system when next he has some work done. Then you can forget to ask for it back. If anyone else wants it done, they can look at what you have lent to the first neighbour and go and get the gear out. But then again, if they become a real pain, the cost may be

justified just to stay on the air peacefully. Again, you need the wisdom of Solomon.

### Running Warfare

When early attempts to achieve a workable solution fail and you find yourself in a running battle with one or more of your neighbours, it will be necessary to enlist the assistance of a technically skilled mediator. This usually means that you somehow get the neighbour to pay the fee and lodge a complaint with the Department of Communications. This means dealing with a radio inspector. This can actually be quite a lot of fun if you have not played with a spectrum analyser before. If you are properly prepared, you can probably get the assistance of the RI and his spectrum analyser to trim coaxial traps and to tune some filters. You can also have a look at the characteristics of some of the interference suppression devices you intend to use. Don't be backward in asking, as the things you are asking are part of the overall solution to the problem. It also demonstrates most effectively your good intent in the solution of the problem. Get into it.

Another aspect of calling in the Radio Inspector is that it is human nature not to place a lot of value on something that is free. Your neighbour, having paid a nominal fee for the attendance of the RI, will possibly be in a better frame of mind to listen to him and to take the advice that he has paid for. Try it, but make sure your TV does not suffer interference under full power conditions and that your station is in generally top class condition.

### Conclusion

The resolution of complaints about amateur radio interference with the reception of television programs is quite difficult, as it impinges upon the passive recreation of a person or family who feel they have done nothing wrong as the problem did not arise until you came along. If the problem goes away when you go away, it MUST be your fault! The technical matters are reasonably well documented. However, you will need to call upon the pinnacle of public relations expertise in order to resolve the average problem.

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Our exclusive range of Brainer 2m/70cm antennas provide excellent performance at a reasonable price. They feature quality Japanese construction and come complete with detailed, locally written instruction sheets so you can get the best from your mobile station.

### a) TM-723m MAGNETIC 2m/70cm ANTENNA

The TM-723m is a compact, slimline dualband mobile antenna ideally suited to vehicles where a permanent mounting position is not available (eg. a company car). While just 0.7m long, the TM-723m provides 1.7dB gain on 2m and 4.7dB gain on 70cm and has a maximum power rating of 50W (conservative). Supplied complete with low loss coax cable fitted with a moulded PL-259 plug.

**\$99<sup>95</sup>** **New for '93**

Cat D-4812

**BRAINER**

### b) ST-7500 2m/70cm ANTENNA

The ST-7500 is a compact, medium gain dualband antenna that provides good performance when gutter or roof mounted. It's just 1m long, provides 3dB gain on 2m and 5.5dB gain on 70cm and has a maximum power rating of 150W. A quality tapered stainless steel whip element and an inbuilt tilt-over mechanism make the ST-7500 ideal for use on vehicles that often have to enter garages or carports. Requires an SO-239 antenna base (D-4035 or D-4052 recommended), or SO-239 magnetic mount (D-4520).

**\$79<sup>95</sup>**

Cat D-4810

**BRAINER**

### c) ST-7800 DELUXE 2m/70cm ANTENNA

Our best dualband mobile antenna! The ST-7800 is ideal for long range mobile operation, providing high gain (4.5dB on 2m, 7.2dB on 70cm) from its 1.5m length. Like the ST-7500, it incorporates an inbuilt tilt-over mechanism to allow laying the antenna over when entering carports, and it can either be gutter or roof-mounted with good results. With its high gain and 150W power rating the ST-7800 can also be used successfully as a temporary base station antenna. Requires an SO-239 antenna base (D-4035 or D-4052 recommended).

**\$129<sup>95</sup>**

Cat D-4815

**BRAINER**

## REVEX SWR/ PWR METERS



Revex meters feature quality Japanese construction, large meter movements and low-loss wideband SWR/PWR sensors. We carry 2 of their popular models, the W502 and the W540, each of which provide 3 power reading scales plus SWR measurement, but with differing frequency coverage.

### W502 HF/6M METER

Covers 1.8 - 60MHz and has an accurate P.E.P. metering circuit. As well, it has 20W, 200W and 2kW scales and a backlit meter. Requires 13.8V DC. Cat D-1360

**\$239**

### W540 VHF/UHF METER

Covers 140 - 525MHz and has an average-reading metering circuit. It has 4W, 20W and 200W scales. Requires no DC power. Cat D-1370

**\$199**

## Great Price! 2 POSITION COAX SWITCH

Cat D-5200

**\$39<sup>95</sup>**

A heavy duty, 2 way coax switch that's suitable for amateur, or commercial applications. It's well constructed with a die-cast case and can handle up to 2kW PEP or 1kW CW at 30MHz with less than 0.2dB insertion loss.



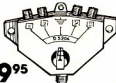
## YAESU SP-4 EXTENSION SPEAKER



This quality speaker has a built-in switchable noise filter and comes with a swing mounting bracket. It handles 3W at 8 ohms and looks smart alongside any RF rig. Comes complete with lead and 3.5mm mono plug. Cat D-2300

**\$39<sup>95</sup>**

## With Surge Protection 4-WAY COAX SWITCH



**\$89<sup>95</sup>**

A high quality 4-way coax switch featuring rugged die-cast aluminium construction, 2kW P.E.P. (max.) power handling at 30MHz, and only 0.3dB insertion loss. It has an in-built surge suppressor and automatic grounding of all un-used connections... in conjunction with a 'ground' position on the switch, it helps protect against lightning induced surge damage. Cat D-5204

## RUGGED HF 5-BAND TRAP VERTICAL ANTENNA

The tradition continues! The 5BTV is yet another masterpiece from the people who have been making antennas for over 33 years. This rugged 5 band HF trap vertical uses Hustler's exclusive trap design (25mm solid fibreglass formers, high-tolerance trap covers and low loss windings), for accurate trap resonance with 1kw(PEP) power handling. Wideband coverage is provided on the 10, 15, 20 and 40m bands (SWR typically 1.15:1 at resonance, less than 2:1 SWR at band edges), with 80kHz bandwidth on 80m at less than 2:1 SWR. An optional 30m resonator kit can also be installed without affecting operation of the other bands.

High strength aluminium tubing and a 4mm (wall thickness) extra heavy-duty base section provides optimum mechanical stability. What's more, stainless steel clamps and hardware guarantee a longer life. At just 7.65m, the 5BTV can be ground mounted (with or without radials, although radials are recommended), or it can be mounted in an elevated position with the radial system. Unlike other antenna designs the 5BTV can be fed with any length of 50 ohm coax cable.

Cat D-4920

**Hurry, last chance  
at the old price!**

**\$299**

Made in USA

### 30m RESONATOR KIT

Adds 30m coverage and includes all hardware.

Cat D-4921

**\$89<sup>95</sup>**

### VRK-1 RADIAL KIT

Provides a 5-band ground-plane for above ground antenna mounting positions.

Cat D-4922

**\$69<sup>95</sup>**

## DIAMOND D-130J DISCONE ANTENNA

This quality Japanese disccone antenna covers the frequency range 25-1300MHz and is easy to assemble and install. With extensive aluminium and stainless steel construction it's extremely durable, while allowing transmission on the 6m, 2m, 70cm and 23cm bands with a maximum power rating of 200W PEP. Complete with bolt mounting hardware, stainless steel U-bolts and instructions.

Cat D-4840

**\$169**

# HUSTLER

## VHF/UHF BASE STATION ANTENNAS

We carry a wide selection of high quality vertically polarised base station antennas to suit most VHF/UHF Amateur applications. Each antenna was chosen based on its tested performance, reliability, construction quality and value for money, so you can be confident they'll work well the first time and last for years. Brands supported include Diamond and Brainer from Japan, as well as an excellent Australian made Mobile One product.

### a) HIGH PERFORMANCE VHF/UHF BASE STATION ANTENNAS

These antennas from Diamond and Brainer are all of a stacked coil type which provide high gain, wide bandwidth and a low radiation angle for extended range base station operation. Each antenna uses a jointed F.R.P. (fibreglass reinforced polyester) outer tubing radome with gasket seals to ensure excellent all weather operation, and is supplied with compact ground-plane radials for a clean radiation pattern. Corrosion resistant stainless steel mounting hardware is also supplied. Brainer antennas are exclusive to Dick Smith Electronics and feature detailed locally written instruction sheets. Both brands are covered by a 1 year warranty.

#### 2m ANTENNA F-23A

Frequency: 144-148MHz  
Gain: 7.8dB  
Max Power: 200W  
Length: 4.53m  
Type: 3 x 1/2" λ colinear  
Connector: SO-239  
Cat D-4850

**\$239**

#### 2m/70cm ANTENNA GST-1

Frequency: 144-148MHz,  
430-440MHz  
Gain: 6.0dB(2m), 8.0dB (70cm)  
Max Pwr: 200W  
Length: 2.6m  
Type: 2 x 1/2" λ colinear (2m),  
4 x 1/2" λ colinear (70cm)  
Cat D-4830

**\$199**

**BRANER**

#### 23cm ANTENNA F-1230A

Frequency: 1260-1300MHz  
Gain: 13.5dBi  
Max Power: 100W  
Length: 3.06m  
Type: 25 x 1/2" λ colinear  
Connector: N-type  
Cat D-4870

**\$299**

#### 2m/70cm ANTENNA GST-3

Frequency: 144-148MHz,  
430-440MHz  
Gain: 7.9dB (2m),  
11.7dB (70cm)  
Max Power: 200W  
Length: 4.4m  
Type: 3 x 1/2" λ colinear (2m),  
7 x 1/2" λ colinear (70cm)  
Connector: SO-239  
Cat D-4835

**\$279**

**BRANER**

### b) ECONOMY 2m BASE STATION ANTENNA

An outstanding value-for-money, compact 1/2 wave Australian-made 2m base station antenna which is only 1.69m long. It uses a single section F.R.P. radome for excellent all-weather operation and covers 144-148MHz with less than 1.5:1 SWR. The antenna provides approximately 3dB gain with a maximum power handling of 200W FM. It's fitted with an SO-239 socket mounted into the base for easy coax connection.

Cat D-4820

5 Year Warranty

**\$49<sup>95</sup>**

**MOBILE ONE**

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B 1440

**DICK SMITH  
ELECTRONICS**

# Right to the Source!

**The Ultimate Way of Ridding the Bands of Intruders**

**Norm Schroeder VK6NS**

SOMETIME BACK I was on 20 metres, and to my astonishment heard music on 14.150 at 5-9 plus 20 dB over! To make matters worse (for me anyway) it was coming from Vienna, where my parents come from and where I went to school. What could I do? It had become a personal thing now!

After some thought, it came to me. As I speak fluent Austrian, I will phone them!

The overseas directory gave me the number very quickly. I asked to be put through to the transmitter supervisor, got him first hit. I said I was speaking from Perth, Western Australia, and that his transmitter was well within our ham band frequency. He said that could not be (but, I could hear him tuning to 14.150 on a Rx somewhere near) and lo and behold, there it was, right where I said!

After profuse apologies he promised to take the offending transmission out of our band!

Three minutes later — it was gone!

## **More About Norm VK6NS**

Born in London in 1922 of Austrian parents; spent half his schooling in Vienna; till 1929, got out of Vienna three days before war broke out, just. But that's another story!

Joined the British Army in 1941 (a bit awkward that, as he has a typical German name!) and spent the next four years overseas, starting off in the North African desert force. Slowly wound his way up Italy and crossed the southern border of Austria the day war finished. Was given special permission to be on the first convoy into Vienna, to see if his parents were still alive!

Found them well, but starving. Out of all his relatives, of which there were many, only one uncle died on the Russian front.

After arranging some basic sustenance for his mother and father via the British Red Cross, he was given permission to fly them to London to their married daughter. He then set out on his first of four migrations. First to Canada; gave up after one year, having an assortment of jobs, such as lumberjack in the northern territories, truck-driver, gas pump attendant etc.

Second migration was to South Africa (Jo-Burg); lasted only six months there. His third migration took him to southern Rhodesia, more truck driving! This time 20-ton 32-wheel low-loaders taking Caterpillar D9s to start off the now famous KARIBA DAM.

When all the heavy plant items were delivered he was offered the job of Site Stores Controller by the contractors, where he first came face to face with two-way radio, a direct link to the-then capital, Salisbury, some 1000 miles to the south of the Zambesi River. At night, when things were quiet, he listened to hams on the two-way, which had short-wave facility built in, and caught the bug! So, on the next four-day leave (once a month) he went to the Post and Telegraph Office in Salisbury and calmly asked for one of them [sic] "ham" licences! Boy, was he in shock when it was explained, in detail, what a ham licence entailed. Undaunted, he armed himself with the appropriate books and previous test papers and took off back to the Kariba dam site. Months later, and with the help of the resident post-office engineer, he decided (with great trepidation) to take his test, which he managed to pass, and received the call Z5J1. Date: 1959.

After the completion of the Kariba Dam he joined the staff of RTV (Rhodesia TV Service) and helped to put the station on air, being the first in southern Africa. Then his former employer from the Kariba dam days sent him to Nigeria to install two-way radios in their building projects north of Lagos (another good story). First stop to the DoC! You guessed it — pick up that rare call sign — 5N2NFS! So he got his full initials. Norman Francis Schroeder! Not difficult, as at that time

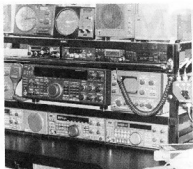


**Norm VK6NS himself, now 70 years old.**



An interesting corner in Norm's shack. Note Pakratt, Computer, and five little TV monitors!

there were only six amateurs there! Date: 1961. By this time he had married Helene (now VK6HI) a year previously, and they had a son whilst there, Mark (now VK6NFS). Now we come to the fourth migration — Australia! But before we tell this incredible life



Close up of the rack. The hand rail (centre) is actually a home made fluoro light.

and jobs here (AND the fear of boring you good people to death), we will terminate this saga and ask you to look at the accompanying photos of his present-day shack.

ar

## VHF — UHF Field Day 1993 — Rules

The Field Day will again be run over the last weekend of the Ross Hull Contest — January 16/17, 1993. The locator based scoring has been retained in the hope of increasing interest in "grid collecting" for the WIA Grid Square Award. Times in the eastern states will be the same as last year, but for VK6 stations the Field Day will begin and end three hours later.

I hope this new timing will encourage more VK6 stations to participate, as the times will now correspond more closely to local time.

This time change will mean that for the first three hours of the Field Day it will be possible for a station in the east to score from a VK6 contact, but the VK6 station could not. However the same will occur in reverse at the end of the Field Day, so the effects should even out.

Field Day contacts can be counted for the Ross Hull Contest, and vice versa. Serial numbers do not have to be consecutive so there is no need to exchange two sets of numbers. The only points to remember are: — You may score repeat contacts for the Field Day, but each station may only appear in your Ross Hull log once per band per day.

Field Day exchanges must include Maidenhead locators.

The other main change is the introduction of a six-hour period as well as the normal 24-hour section. This will make it eas-

ier for those who can only go out for one day.

### Duration

VK6 only: 0500 UTC Saturday 16 January to 0500 UTC Sunday 17 January.

All other call areas: 0200 UTC Saturday to 0200 UTC Sunday.

### Sections

- A: Portable station, single operator, 24 hours.
- B: Portable station, single operator, 6 hours.
- C: Portable station, multiple operator, 24 hours.
- D: Home station.

Single operator stations may enter for both Section A and Section B.

### General Rules

All modes and bands above 30 MHz may be used. Contest exchanges should not be made on recognised DX calling frequencies. Repeater and crossband contacts are not allowed. Entrants may not operate from more than one locator square. You may work stations within your own locator square.

### Contest Exchange

RS or RST reports, a three-digit serial number (serial numbers need not be consecutive), and your Maidenhead locator.

### Repeat Contacts

Stations may be worked again on each band after four hours.

### Scoring

1 point per contact, 2 points if both stations are portable. Band multipliers:

6 m 2 m 70 cm 23 cm 2.3 GHz Higher  
x 1 x 4 x 7 x 10 x 13 x 16

For each band, multiply the points score (either 1 or 2 points per contact) by the number of locator squares worked on that band, then by the appropriate band multiplier. For example, on 2 metres, 20 points x 4 squares x 4 = 320 points.

See the same scoring table below.

### Logs

For each contact: UTC time, band, station worked, serial numbers and locator numbers exchanged, points claimed. The front sheet should contain the name, address and call sign of the operator, section entered, and a scoring table as follows:

| Band  | Points | Squares | Multiplier | Total |
|-------|--------|---------|------------|-------|
| 6 m   | XXXX   | x XXXX  | x 1 =      | XXXX  |
| 2 m   | XXXX   | x XXXX  | x 4 =      | XXXX  |
| 70 cm | XXXX   | x XXXX  | x 7 =      | XXXX  |
| etc.  |        |         |            |       |

Overall Total

XXXX

### Entries

Post logs to the Manager, VHF-UHF Field Day, PO Box 300, Caulfield South, Vic 3162. Logs must be received by Monday, February 1, 1992. Early logs would be appreciated.

### Awards

The overall winner will be the highest all-band scorer in Section A. Awards will also be made to the highest scorer on each band in Section A, and the highest scorers in Sections B, C and D.

ar

**Help stamp out stolen equipment — keep a record of all your equipment serial numbers in a safe place.**

# AsiaNet IBM Library

Les Kinch VK2BBD  
Longford  
Bendemeer NSW 2355

**I**NOTED IN THE March issue you gave publicity to the very worthwhile Commodore library that operates from Fremantle WA. I am in fairly frequent contact with John VK6YBP as we exchange notes on the most efficient way of running these disk-based libraries.

In 1988 I established an IBM library — usually called the AsiaNet IBM Library, and have concentrated on issuing packet bulletins from time to time to let those interested know just what new stuff I have received. The response has always been very good.

These lists are usually retained on many of the Packet BBSs for access by local users — all over the world. I have yet to hear of a similar library anywhere — so I guess I must be "IT!". Customers have been from as far away as Norway, Sweden, Germany, England, Cyprus, Greece, Hongkong, Taiwan, Ascension Island, Philippines, Hawaiian islands, NZ and all Australian states.

However, am I getting to the majority of Amateurs with these really super programs? — I think not. Not every amateur is a Packet radio buff, however I carry a heap of programs not necessarily involved with packet.

## Editor's Note:

*The programs are classified into a number of "libraries" entitled Comms, Ham, Utill and 2, Games. Regrettably, space pressures do not permit publication of a full listing in AR, but as a sample of what is available, the "Ham" library is reproduced here together with ordering information ... VK3UV (Production Editor).*

## Library Ordering Information:

Disk size catered for: 3.5 inch 720/1.44 — cost \$5.00 each disk.

5.25 inch 360k/1.2MB — cost \$3.50 each disk.

Disk prices INCLUDE disks, packaging, postage and DOC (if needed) ALL docs are on disk for local printout.....

Overseas Orders: Prices are in US\$, except for NZ customers who may forward Australian Dollars.

ALL programs are COMPRESSED to save space. Most are compressed using PKZIP or LHARC. Some are self-extracting files as used by the originator. In any case the sizes you see on the various lists are those you should consider when you make up your program order.

When making up your order for the Library, consider these points:

1. Disks can contain 360K, 720K, 1.4MB or 1.2Mb — depending on your preference.
2. If you have programs totalling 375K for sending on a 360K disk that will use TWO disks — whichever way

## HAM PROGRAMS:

July 92

| PROGRAM   | SIZE(K) | BRIEF DESCRIPTION OF PROGRAM:                      |
|-----------|---------|--|
| ALINCOMOD | 53      | COLLECTION OF "ALINCOM" MODS                       |
| ARLOGD1   | 267     | A COMPREHENSIVE LOG-BOOK PROGRAM                   |
| ARLOGD2   | 309     | PART TWO OF ABOVE                                  |
| ARLOGBK   | 286     | LOG BOOK PROGRAM                                   |
| AZDENMOD  | 4       | SOME MODS FOR "AZDEN" RIGS                         |
| ANTPLT    | 74      | PRETTY COMPREHENSIVE ANTENNA-PLOTTING ROUTINE      |
| BANDAID   | 122     | A HAM "COMPANION" WORLD MAP. FOR XT ONLY IT SEEMS. |
| BAY-NEW   | 70      | SOME LATER NOTES ON BAYCOM                         |
| C64MODS   | 5       | SOME C64 COMPUTER MODS                             |
| CWTUTOR   | 131     | CW TUTOR PROGRAM                                   |
| CONLOG    | 98      | CONTEST LOG PROGRAM                                |

you juggle it. Better to find some more programs to fill the disks usefully — I don't mind. The same rules apply to ALL sizes of disks.

3. Having seen the Library lists, If you have FREEWARE/SHAREWARE programs which you think would be useful additions to this library, please feel free to send them on to me. I will offer you free choice of the library for such donations — this is the way the system improves.
4. Any suggestions for improving this Library format would be welcomed. It has been going since 1988 with little feedback but a lot of orders, so I am hoping it is OK as it is — still I am open to change.
5. If you don't have the "Un-Packing" programs — please say so on your order — you might order the latest version of "LHA" anyway as I shall be using that one more and more from now on.
6. New File-name Convention: A file name such as LHA212@.EXE or similar will always mean that it is self-extracting file and may well use a complete disk to extract the contained programs.
7. Interesting note; my disks contain a large amount of compressed programs. Shareware/Freeware disks usually contain just the ONE subject program.
8. If you leave enough room on the disk(s) you order I will always attempt to fill the disks up completely with the latest programs you may not have heard about. Now, that's value!

Order Address: Les Kinch VK2BBD, Longford, Bendemeer, NSW 2355.

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|           |       |   |
|-----------|-------|---|
| CONLOG20  | 134   | CONTEST-LOG V20 FROM USA                                  |
| COUNTRIES | 177   | A LIST OF USA COUNTIES                                    |
| CWTUTOR   | 98    | SAYS IT ALL   |
| CWWWLOG   | 150   | CW W/W LOG KEEPING FROM USA                               |
| DAZCOM    | 70    | A TERMINAL PROGRAM BY VK2DAZ                              |
| EA-PROJ   | 18    | LISTING OF "EA MAGAZINE" PROJECTS                         |
| ELECTRON  | 86    | MANY FORMULAE FOR ELECTRONICS                             |
| ETI-PROJ  | 15    | LISTING OF "ETI" PROJECTS ..                              |
| FILTER    | 34    | SOME FILTER IDEAS FOR YOU                                 |
| FL2100MD  | 3     | SOME MODS FOR FL2100 LINEAR                               |
| FTMODS    | 27    | SOME MODS FOR YAESU "FT" SERIES                           |
| GREYLINE  | 78    | DISPLAY WORLD-GLOBE/TIME ZONES<br>FOR "DX" PATH           |
| HAMCALC1  | 195   | GETTING INTO THE "HEAVY FORMULA"<br>STUFF 1               |
| HAMCALC2  | 189   | PART TWO OF THIS  |
| HAMRTTY   | 142   | A WORKING GUIDE TO RTTY — SOME<br>SOFTWARE PROGRAMS       |
| HAMSSTV   | 38    | SOFTWARE APPROACH TO SSTV — WITH<br>DIGITIZED PICS        |
| HYPERLOG  | 220   | COMPREHENSIVE HAM LOG-BOOK FROM<br>USA                    |
| ICOMQSY   | 132   | QSY PROGRAM FOR "ICOM" GEAR WITH<br>APPROPRIATE PCB'S     |
| ICOMODS   | 190   | SOME ICOM RADIO MODS                                      |
| KDK2016   | 3     | SOME MODS FOR THE KDK2016                                 |
| KENWMODS  | 62    | SOME MODS FOR KENWOOD "HF" GEAR                           |
| MORSE201  | 91    | "SUPERMORSE" - THE BEST MORSE PRO-<br>GRAM TO DATE.       |
| MORSEDOS  | 17    | HOW ABOUT MORSE RESPONSE FROM<br>YOUR DOS ???             |
| MOTROLA   | 306   | MOTOROLA DATABASE OF IC'S (1 DISK,<br>REALLY)             |
| MOTROLA2  | 389   | MOTROLA D/B LATER VERSION (NEEDS<br>720K DISK)            |
| NACONLOG  | 180   | NORTH-AMERICAN CONTEST LOG                                |
| OZSPLIT   | 24    | SPLITS LONG FILES INTO APPROX 3K<br>PACKETS FOR TX.       |
| PCHAM     | 140   | A CONTEST STYLE DATA-BASE..... NEEDS<br>BASIC.            |
| PROSCANM  | 15    | SOME MODS FOR THE "PRO" SCANNERS                          |
| SATFIND   | 49    | A REAL-TIME DISPLAY OF SATELLITES —<br>GREAT PROGRAM.     |
| SCANBATM  | 7     | MODS FOR SCANNER BATTERY PACKS                            |
| TNCMODS   | 74    | SOME MODS FOR TNCs  |
| TOPLOG    | 1.2MB | MASSIVE LOG-BOOK PROGRAM FROM<br>ITALY-VERY COMPREHENSIVE |
| VHF-UHF   | 50    | UHF/VHF ANTENNA DESIGN                                    |
| YAGIMAX   | 342   | MAXIMIZE YOUR YAGI ARRAYS                                 |
| YAGINEC   | 186   | SMITH CHARTS/POLAR DIAGS AND<br>THINGS                    |
| YAGIOPT   | 173   | GOOD YAGI DESIGN PROGRAM                                  |
| YASUMODS  | 32    | YAESU MOD COLLECTION                                      |
| WA9GFR    | 130   | SMITH CHARTS-HF/VHF PROPAGATION<br>CALCS.                 |
| WTIME     | 25    | "WORLD-TIME" DISPLAY — ALL ZONES —<br>GOOD ONE!           |
| YAGIOPT   | 173   | IF YOUR ARE "INTO" DESIGN — YOU<br>NEED THIS ONE          |
| CWTUTOR   | 95    | MACHINE LANGUAGE MORSE PROGRAM<br>— HONE-UP YOUR SPEED    |

## ALARA

Robyn Gladwin VK3ENX

PO Box 438 Chelsea Vic 3196

I would like to extend my best wishes for the New Year to all. As communication technology truly makes the world a "global village", it is to be hoped that the radio friendships made by amateur operators can continue to foster understanding and tolerance between nations.

An interesting example of international cooperation through amateur radio is the experience of Joan Beevers, VK3JBH, who decided to learn some "Basic Japanese" six years ago. Joan was the VK contact and support person for YL Kyoko Imakiire, JJ6PPJ/MM, during her 187 day solo voyage around the world in the yacht, "Kai-ren". Kyoko left her home port of Kagoshima, Japan, on 12th October, 1991, and arrived back there safely on 15th July, 1992. Joan was also very busy supporting Kyoko's back-up crew via radio, phone, fax and phone patch. Joan was asked if she could be on standby to support the famous Japanese yachtsman/adventurer, Kennichi Horie, from 31st October, 1992, when he will attempt a Pacific crossing from Hawaii to Okinawa by foot-peddalling his new boat, "Mermaid". She was support station for him once before when he sailed from San Francisco to Japan.

The ALARA luncheons in VK5, VK3 and VK6, and the VK4 Net are proving popular as a means of both supporting YL amateurs and of encouraging others to join our hobby. VK2 has members spread all over the State but individuals like Dorothy Bishop, VK2DDB, are helping to attract new recruits by using the ALARA publicity kit now held by each State Representative. Dorothy set up a table at the recent annual Hornsby and District Amateur Radio Club (HADARC) exhibition at the Hornsby Hospital fete. This year she was kept busy answering questions from many interested ladies.

As 1993 begins, here is a reminder of the various YL Nets. This is an enjoyable activity for members and an excellent introduction to on air contacts for new operators.

Official ALARA Net: Mondays 3.580+/-1030 UTC (or 1000UTC during daylight saving) VK6 ALARA/YL Net: Conducted by Poppy, VK6YF, following the national net on Mondays 3.585+/-1200 UTC.

YL "222" DX Net: Mondays 14.222 066 UTC. Call in from 0545 UTC. Net control: Dave, ZL1AMN.

European YL DX Net: Thursdays  
14.243 + - 1700 UTC. Net control:  
Christine, G4MYMM.  
VE/VK/ZL Net: Fridays 14.148 0500  
UTC.  
VK4 CQYL Net: Fridays 3.580 + - 0930  
UTC.  
YL Activity Day: 6th of each month.  
Listen on the hour and/or call "CQ YL".  
Frequencies — 14.288 21.188 28.588.  
YL Chat: Bev, VK6DE, has a YL chat  
on Fridays 21.188 0400 UTC. **ar**

## AMSAT Australia

*Bill Magnusson VK3JT*  
359 Williamstown Rd Yarraville  
VIC 3103 Packet: VK3JT@VK3BBS

### National co-ordinator

Graham Ratcliff VK5AGR  
Packet: VK5AGR@VK5WI  
Please take note of the AMSAT information  
nets:  
**AMSAT Australia net:**  
Control station VK5AGR  
Bulletin normally commences at 1000z, or  
0900z depending on daylight saving and  
propagation. Check-ins commence 15  
minutes prior to the bulletin.  
**Frequencies:** (again depending on propaga-  
tion conditions)

Primary 7.064 MHz. (Usually during  
summer).  
Secondary 3.685 MHz. (Usually during  
winter).

Frequencies +/- 5 kHz for QRM.  
AMSAT South West Pacific net:  
2200z Saturday on 14.282 MHz.  
Experienced satellite users and new-  
comers alike are welcome on the nets. A  
large body of experience is on hand to  
answer queries. Listen to the WIA divisional  
broadcasts for regular up to date AMSAT  
information.

AMSAT Australia newsletter and soft-  
ware service:  
Satellite users whether experienced or new-  
comers will benefit by subscribing to the  
AMSAT Australia newsletter and soft-ware  
service. The newsletter is published monthly  
by Graham VK5AGR. Subscription is \$25  
for Australia, \$30 for New Zealand and \$35  
for other countries by AIR MAIL. It is pay-  
able to AMSAT Australia addressed as  
follows:

AMSAT Australia  
PO Box 2141 Adelaide SA 5001  
The newsletter provides up to date infor-  
mation on all current and planned amateur  
radio satellite activities. Graham also pro-  
vides a first class soft-ware service for satel-  
lite users. New software is reviewed regularly  
in the newsletter.

Here we are at the start of 1993. What  
happened to 1992? This month's column

will be devoted to a run down on the status  
of the currently operational amateur radio  
satellites. Last month I mentioned ZRO  
tests and their importance in an educational  
sense to help discourage thoughtless be-  
haviour and emphasise the benefits of im-  
proving your station's listening perfor-  
mance. I will hold further discussion of this  
over until next month.

AO-10 (AMSAT Oscar-10). The first of  
the highly elliptical orbit amateur radio  
satellites. Oscar-10 is out of control due to  
radiation damage to the on board computer  
memory. It is permanently switched into  
mode B operation and switches itself off  
and on randomly depending to some extent  
on sun angle and state of battery charge.  
Oscar-10 is producing some excellent op-  
portunities for long distance contacts but at  
times it requires a fair amount of power to  
access at long range. The attitude is  
unknown at present since no telemetry has  
been received for a number of years and  
further extrapolation is impossible.

UO-11 (UoSAT Oscar-11). The second in  
the University of Surrey (England) series.  
There are no transponders on this satellite.  
Its prime purpose is educational. It carries  
beacons and telemetry transmitters, and its  
signals are tracked by schools, colleges, and  
universities around the world. Full  
documentation is available to educational  
and amateur users from UoS. It continues  
to be fully operational and the controllers  
are always anxious to hear from new users.

FO-12 (Fuji Oscar-12). This satellite was  
fully operational when turned off some  
time ago. It always suffered from power  
budget problems and was subject to un-  
scheduled mode changes.

AO-13 (AMSAT Oscar-13). Second and  
latest high altitude elliptical orbit amateur  
radio satellite. Fully operational and under  
complete control. AO-13 has spent much of  
its life with its apogees over the northern  
hemisphere but is moving slowly south and  
should provide some excellent operating this  
and next year. Projected demise is 1996, so  
get in there and use it while you can, and  
while conditions are good and improving.

UO-14 (UoSAT Oscar-14) Third in the  
UoS series. This satellite was switched from  
amateur radio use to commercial use some  
time after commissioning, and is currently  
in operational use by humanitarian relief  
organisations in Africa. All amateur radio  
operations formerly carried on via UO-14  
are now carried via UO-22. Its future in  
amateur radio is unknown.

UO-15 (UoSAT Oscar-15). Contact was  
lost with this bird shortly after launch, ef-  
forts so far to recover control have been  
unsuccessful.

AO-16 (AMSAT Oscar-16) (Pacsat).  
Operating normally with BBS using raised  
cosine transponder. All functions  
operational.

DO-17 (AMSAT Oscar-17) (Dove). This  
satellite is rarely heard and is still causing  
problems for the control station. Efforts to  
upload new software are continuing. Maybe  
some good news in 1993?

WO-18 (Webersat Oscar-18). An educa-  
tional satellite from Weber State College.  
Producing telemetry and pictures from an  
earth pointing CCD camera. Pictures so far  
have been of only fair quality compared to  
the UoSATS.

LO-19 (LUSAT Oscar-19). Fully opera-  
tional 9600 bps BBS taking quite a bit of load  
off UO-22.

FO-20 (Fuji Oscar-20). Full operational  
with A and D transponders alternating  
reliably. Good QSOs and an excellent 9600  
bps BBS.

AO-21 (AMSAT-USA Oscar-21). Fully  
operational at present running 9 minutes of  
FM repeater and 1 minute of telemetry in  
each 10 minute time frame. Downlink signal  
is very strong but uplink appears to be  
difficult to access. Use 50 watts into an auto  
track circular polarised antenna for best  
results. This bird carries a lot of experimen-  
tal gear so it could change operating modes  
at any time.

UO-22 (UoSAT Oscar-22). Best UoSAT  
so far. Fully operational 9600 bps BBS. Very  
busy, carrying loads of traffic. Heaps of  
telemetry etc. Probably represents the "cut-  
ting edge" of amateur radio satellite tech-  
nology. This one will be a hard act to fol-  
low and no doubt future amateur radio  
satellites will carry clones of its hardware  
systems.

KO-23 (Kitsat Oscar-23). Korean copy of  
a UoSAT. Still under commissioning, work-  
ing well with software uploads continuing.  
Hopefully its BBS will take some load from  
UO-22 when fully operational.

RS-10/11 and RS-12/13. Both going well  
but rather under used in this part of the  
world. Modes vary but mostly A and K.  
Long haul "over-the-horizon" contacts are  
possible with these birds. I will devote a  
column to them shortly to see if we can stir  
up some activity. They are popular in  
Europe where regular long haul contacts are  
made.

MIR (The Russian Space Station). Hardly  
an amateur radio satellite but regular  
amateur radio activity by each crew has  
made us come to regard it as one. The ac-  
tivity continues both on packet and voice.  
MIR is probably the easiest satellite to  
work. Just last night I had a QSO from my  
backyard using a handheld transceiver  
whilst watching them travel overhead in the  
dark sky.

Welcome to 1993. It looks like being an  
exciting year for amateur radio satellites.  
Next month I will touch on ZRO tests and  
look at the amateur radio satellites currently  
under construction or planned for launch  
over the next year or two. **ar**



# HF PREDICTIONS

Evan Jarman VK3ANI

## The Tables Explained

The tables provide estimates of signal strength for each hour of the UTC day for the five bands from 14 to 28 MHz. The UTC hour is the first column; the second column lists the predicted MUF (maximum useable frequency); the third column the signal strength in dB relative to 1  $\mu$ V (dB $\mu$ V) at the MUF; the fourth column lists the "frequency of optimum travel" (FOT), or the optimum working frequency as it is more generally known.

The signal strengths are all shown in dB relative to a reference of 1  $\mu$ V in 50 Ohms at the receiver antenna input. The table below relates these figures to the amateur S-point "standard" where S9 is 50  $\mu$ V at the

receiver's input and the S-meter scale is 6 dB per S-point.

| $\mu$ V in 50 Ohms | S-points | dB( $\mu$ V) |
|--------------------|----------|--------------|
| 50.00              | S9       | 34           |
| 25.00              | S8       | 28           |
| 12.50              | S7       | 22           |
| 6.25               | S6       | 16           |
| 3.12               | S5       | 10           |
| 1.56               | S4       | 4            |
| 0.78               | S3       | 2            |
| 0.39               | S2       | - 8          |
| 0.20               | S1       | - 14         |

The tables are generated by the GRAPH DX program from FT Promotions, assuming 100 W transmitter power output, modest beam antennas (eg three element Yagi or cubical quad) and a short-term fore-

cast of the sunspot number. Actual solar and geomagnetic activity will affect results observed.

The three regions cover stations within the following areas:

**VK EAST** The major part of NSW and Queensland.

**VK SOUTH** Southern-NSW, VK3, VK5 and VK7.

**VK WEST** The south-west of Western Australia.

Likewise, the overseas terminals cover substantial regions (eg "Europe" covers most of Western Europe and the UK).

The sunspot number used to generate this month's predictions is 62. The predicted value for next month is 61.

Please note the return of the ten metre band and the slight change in format.

The change in format is part of an on-going process of which more will be said next month.

ar

## SHORT PATH

### EASTERN AUSTRALIA

| UTC | MUF  | dB $\mu$ V | FOT  | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |
|-----|------|------------|------|------|------|------|------|------|
| 1   | 9.9  | -7         | 7.5  | 0    | -8   | -21  | ---  | ---  |
| 2   | 9.3  | -16        | 7.2  | -1   | -8   | -20  | -39  | ---  |
| 3   | 12.6 | -6         | 9.8  | -2   | -2   | -7   | -19  | -34  |
| 4   | 19.0 | 3          | 14.6 | -7   | 2    | 2    | -1   | -9   |
| 5   | 25.2 | 6          | 19.4 | -12  | 2    | 6    | 6    | 3    |
| 6   | 26.3 | 8          | 20.5 | -15  | 7    | 7    | 8    | 6    |
| 7   | 26.3 | 8          | 20.9 | -14  | 2    | 7    | 9    | 7    |
| 8   | 25.6 | 9          | 20.8 | -10  | 4    | 9    | 9    | 6    |
| 9   | 24.7 | 10         | 20.5 | -4   | 8    | 11   | 10   | 6    |
| 10  | 23.7 | 13         | 19.1 | 6    | 14   | 14   | 11   | 6    |
| 11  | 22.6 | 16         | 18.1 | 17   | 20   | 18   | 13   | 6    |
| 12  | 21.6 | 20         | 17.3 | 26   | 25   | 20   | 13   | 5    |
| 13  | 21.1 | 23         | 16.8 | 33   | 28   | 22   | 14   | 4    |
| 14  | 20.5 | 24         | 16.2 | 36   | 30   | 23   | 13   | 2    |
| 15  | 19.8 | 25         | 16.0 | 37   | 29   | 22   | 11   | 0    |
| 16  | 18.7 | 26         | 14.6 | 37   | 28   | 19   | 8    | -5   |
| 17  | 17.6 | 27         | 13.6 | 36   | 26   | 16   | 4    | -10  |
| 18  | 16.4 | 28         | 12.6 | 34   | 23   | 13   | -1   | -17  |
| 19  | 15.5 | 29         | 11.8 | 32   | 20   | 9    | -6   | -23  |
| 20  | 15.8 | 28         | 12.0 | 32   | 20   | 9    | -6   | -23  |
| 21  | 15.4 | 24         | 11.4 | 27   | 15   | 4    | -12  | -31  |
| 22  | 13.6 | 20         | 10.5 | 19   | 9    | -3   | -20  | -39  |
| 23  | 13.4 | 15         | 10.3 | 14   | 6    | -4   | -20  | -39  |
| 24  | 12.1 | 6          | 9.2  | 7    | -1   | -11  | -28  | ---  |

### SOUTHERN AUSTRALIA

| UTC | MUF  | dB $\mu$ V | FOT  | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |
|-----|------|------------|------|------|------|------|------|------|
| 1   | 10.0 | -3         | 7.7  | 1    | -9   | -22  | ---  | ---  |
| 2   | 9.4  | -13        | 7.2  | 1    | -9   | -22  | ---  | ---  |
| 3   | 13.0 | -4         | 9.7  | -1   | -7   | -19  | -33  | ---  |
| 4   | 19.9 | 4          | 15.4 | -6   | 3    | 3    | 0    | -7   |
| 5   | 23.3 | 6          | 19.2 | -12  | 2    | 6    | 2    | -2   |
| 6   | 23.1 | 8          | 18.9 | -15  | 0    | 5    | 2    | -2   |
| 7   | 23.0 | 5          | 18.7 | -15  | 0    | 4    | 5    | 1    |
| 8   | 22.7 | 5          | 18.5 | -13  | 1    | 5    | 5    | 1    |
| 9   | 22.4 | 6          | 18.2 | -10  | 3    | 6    | 5    | 1    |
| 10  | 21.8 | 8          | 17.6 | -3   | 7    | 8    | 6    | 1    |
| 11  | 20.8 | 11         | 16.7 | 6    | 12   | 11   | 6    | 0    |
| 12  | 19.7 | 16         | 15.8 | 17   | 17   | 14   | 6    | -2   |
| 13  | 18.6 | 21         | 14.8 | 27   | 22   | 15   | 5    | -6   |
| 14  | 17.8 | 24         | 14.1 | 31   | 23   | 15   | 3    | -10  |
| 15  | 17.1 | 25         | 13.5 | 32   | 23   | 13   | 0    | -14  |
| 16  | 16.5 | 27         | 13.0 | 33   | 22   | 11   | -2   | -18  |
| 17  | 15.8 | 28         | 12.3 | 32   | 20   | 9    | -6   | -24  |
| 18  | 15.0 | 28         | 11.6 | 31   | 18   | 5    | -11  | -31  |
| 19  | 14.4 | 29         | 11.0 | 29   | 15   | 2    | -15  | -35  |
| 20  | 14.2 | 29         | 10.7 | 29   | 14   | 1    | -17  | -37  |
| 21  | 14.9 | 27         | 11.1 | 29   | 17   | 4    | -12  | -30  |
| 22  | 15.6 | 22         | 11.7 | 25   | 14   | 3    | -12  | -30  |
| 23  | 14.5 | 19         | 10.9 | 18   | 9    | -2   | -17  | -36  |
| 24  | 12.6 | 10         | 9.6  | 9    | 0    | -10  | -28  | ---  |

### WESTERN AUSTRALIA

| UTC | MUF  | dB $\mu$ V | FOT  | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |
|-----|------|------------|------|------|------|------|------|------|
| 1   | 9.2  | 5          | 7.0  | -1   | -21  | ---  | ---  | ---  |
| 2   | 8.6  | -6         | 6.7  | -4   | -21  | ---  | ---  | ---  |
| 3   | 11.8 | -1         | 8.8  | 1    | -5   | -16  | -33  | ---  |
| 4   | 17.9 | 5          | 13.8 | 1    | 5    | 2    | -6   | -16  |
| 5   | 23.1 | 7          | 17.4 | -3   | 7    | 8    | 5    | 0    |
| 6   | 23.4 | 7          | 18.0 | -6   | 5    | 8    | 6    | 2    |
| 7   | 23.4 | 7          | 18.8 | -8   | 4    | 7    | 6    | 2    |
| 8   | 23.2 | 7          | 18.8 | -7   | 5    | 7    | 6    | 2    |
| 9   | 22.8 | 7          | 18.6 | -5   | 6    | 8    | 6    | 1    |
| 10  | 22.3 | 8          | 18.1 | -1   | 8    | 9    | 6    | 1    |
| 11  | 21.6 | 10         | 17.9 | 5    | 11   | 11   | 6    | 0    |
| 12  | 20.7 | 14         | 16.7 | 15   | 17   | 14   | 7    | -1   |
| 13  | 19.7 | 19         | 15.8 | 26   | 22   | 16   | 7    | -4   |
| 14  | 18.8 | 23         | 15.0 | 32   | 24   | 16   | 5    | -7   |
| 15  | 18.3 | 24         | 14.5 | 33   | 24   | 16   | 3    | -10  |
| 16  | 17.7 | 25         | 14.0 | 34   | 24   | 14   | 1    | -13  |
| 17  | 17.1 | 26         | 13.9 | 34   | 23   | 12   | -1   | -17  |
| 18  | 16.2 | 27         | 12.7 | 33   | 20   | 9    | -6   | -23  |
| 19  | 15.3 | 27         | 11.9 | 31   | 18   | 5    | -11  | -30  |
| 20  | 14.4 | 28         | 11.1 | 29   | 14   | 0    | -18  | -39  |
| 21  | 13.8 | 28         | 10.6 | 27   | 11   | -3   | -23  | ---  |
| 22  | 13.3 | 26         | 10.4 | 25   | 8    | -8   | -29  | ---  |
| 23  | 13.0 | 24         | 9.8  | 20   | 3    | -13  | -36  | ---  |
| 24  | 11.4 | 17         | 8.6  | 10   | -7   | -25  | ---  | ---  |

## Africa

| UTC | MUF  | dB $\mu$ V | FOT  | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |
|-----|------|------------|------|------|------|------|------|------|
| 1   | 14.8 | 7          | 10.4 | 6    | 5    | 0    | -11  | -24  |
| 2   | 14.8 | 4          | 11.3 | 3    | 4    | 0    | -9   | -21  |
| 3   | 14.8 | 0          | 11.2 | -1   | 2    | -1   | -9   | -20  |
| 4   | 17.0 | 1          | 12.8 | -5   | 2    | -1   | -3   | -11  |
| 5   | 20.1 | 3          | 14.1 | -8   | 2    | 3    | 0    | -5   |
| 6   | 20.3 | 3          | 14.2 | -10  | 1    | 3    | 1    | -5   |
| 7   | 20.3 | 3          | 14.2 | -10  | 1    | 3    | 1    | -5   |
| 8   | 20.2 | 4          | 14.2 | -8   | 2    | 4    | 1    | -5   |
| 9   | 20.0 | 5          | 14.1 | -5   | 4    | 5    | 1    | -5   |
| 10  | 19.1 | 6          | 14.0 | -1   | 6    | 5    | 0    | -7   |
| 11  | 18.1 | 8          | 13.9 | 4    | 8    | 6    | 0    | -10  |
| 12  | 17.1 | 10         | 13.7 | 8    | 9    | 5    | -3   | -13  |
| 13  | 16.4 | 13         | 13.0 | 13   | 11   | 5    | -5   | -17  |
| 14  | 15.7 | 17         | 12.4 | 18   | 13   | 5    | -7   | -21  |
| 15  | 15.1 | 22         | 11.9 | 24   | 15   | 4    | -10  | -26  |
| 16  | 14.4 | 26         | 11.2 | 26   | 14   | 2    | -14  | -32  |
| 17  | 13.7 | 28         | 10.6 | 26   | 13   | 0    | -18  | -39  |
| 18  | 13.2 | 29         | 10.1 | 26   | 11   | -3   | -23  | ---  |
| 19  | 13.0 | 30         | 9.7  | 26   | 10   | -4   | -24  | ---  |
| 20  | 13.6 | 29         | 9.3  | 27   | 12   | -1   | -20  | ---  |
| 21  | 13.0 | 24         | 8.9  | 21   | 8    | 5    | -24  | ---  |
| 22  | 12.6 | 18         | 8.7  | 16   | 3    | -7   | -25  | ---  |
| 23  | 12.6 | 12         | 8.7  | 12   | 3    | -7   | -24  | ---  |
| 24  | 13.3 | 9          | 9.3  | 9    | 4    | -4   | -18  | -35  |

## Africa

| UTC | MUF  | dB $\mu$ V | FOT  | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |
|-----|------|------------|------|------|------|------|------|------|
| 1   | 15.7 | 12         | 10.9 | 12   | 10   | 7    | -7   | -20  |
| 2   | 15.9 | 10         | 12.0 | 8    | 8    | 3    | -5   | -17  |
| 3   | 18.3 | 9          | 14.0 | 5    | 9    | 7    | 0    | -8   |
| 4   | 20.7 | 8          | 14.8 | 0    | 8    | 4    | -2   | -    |
| 5   | 20.7 | 6          | 14.8 | -3   | 6    | 6    | 3    | -3   |
| 6   | 20.7 | 6          | 14.8 | -5   | 5    | 6    | 2    | -3   |
| 7   | 20.6 | 5          | 14.7 | -5   | 4    | 5    | 2    | -3   |
| 8   | 20.6 | 5          | 14.6 | -5   | 4    | 5    | 2    | -3   |
| 9   | 20.7 | 6          | 14.7 | -3   | 6    | 3    | -3   | -    |
| 10  | 20.2 | 7          | 14.3 | 0    | 7    | 7    | 3    | -4   |
| 11  | 19.4 | 9          | 13.6 | 4    | 9    | 8    | 2    | -6   |
| 12  | 18.2 | 11         | 12.8 | 9    | 11   | 7    | 0    | -9   |
| 13  | 17.1 | 13         | 12.0 | 14   | 12   | 7    | -2   | -14  |
| 14  | 16.2 | 16         | 11.3 | 18   | 13   | 6    | -5   | -19  |
| 15  | 15.5 | 21         | 10.7 | 24   | 15   | 5    | -8   | -24  |
| 16  | 14.8 | 25         | 10.2 | 27   | 15   | 3    | -12  | -31  |
| 17  | 14.2 | 27         | 9.8  | 27   | 14   | 1    | -16  | -36  |
| 18  | 13.6 | 28         | 9.5  | 26   | 12   | -2   | -21  | ---  |
| 19  | 13.4 | 29         | 9.4  | 27   | 11   | -3   | -23  | ---  |
| 20  | 13.5 | 29         | 9.5  | 27   | 12   | -2   | -21  | ---  |
| 21  | 13.9 | 26         | 9.6  | 25   | 12   | 0    | -18  | -38  |
| 22  | 13.5 | 22         | 9.4  | 20   | 9    | -3   | -20  | ---  |
| 23  | 13.5 | 18         | 9.5  | 17   | 8    | -3   | -19  | -38  |
| 24  | 14.3 | 15         | 10.1 | 15   | 8    | 0    | -14  | -31  |

## Africa

| UTC | MUF  | dB $\mu$ V | FOT  | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |
|-----|------|------------|------|------|------|------|------|------|
| 1   | 14.3 | 17         | 10.7 | 17   | 9    | 0    | -15  | -33  |
| 2   | 14.9 | 14         | 11.3 | 14   | 10   | 2    | -10  | -25  |
| 3   | 17.1 | 11         | 13.5 | 10   | 11   | 6    | -2   | -13  |
| 4   | 20.7 | 11         | 15.8 | 6    | 11   | 10   | 5    | -2   |
| 5   | 21.6 | 9          | 16.0 | 2    | 9    | 9    | 5    | -1   |
| 6   | 21.6 | 8          | 17.7 | 0    | 8    | 8    | 4    | -2   |
| 7   | 21.4 | 7          | 17.5 | -1   | 7    | 7    | 4    | -2   |
| 8   | 21.2 | 7          | 17.3 | -1   | 7    | 7    | 4    | -2   |
| 9   | 21.0 | 8          | 17.1 | 0    | 7    | 7    | 3    | -3   |
| 10  | 20.8 | 8          | 16.9 | 2    | 9    | 8    | 3    | -3   |
| 11  | 20.2 | 10         | 16.6 | 5    | 10   | 9    | 3    | -5   |
| 12  | 19.3 | 12         | 15.5 | 11   | 13   | 9    | 2    | -7   |
| 13  | 18.3 | 15         | 14.6 | 16   | 15   | 10   | 0    | -11  |
| 14  | 17.2 | 18         | 13.7 | 22   | 16   | 9    | -2   | -15  |
| 15  | 16.5 | 20         | 12.8 | 27   | 18   | 7    | -5   | -20  |
| 16  | 15.8 | 25         | 12.5 | 30   | 18   | 7    | -8   | -25  |
| 17  | 15.2 | 27         | 12.3 | 30   | 17   | 5    | -11  | -30  |
| 18  | 14.5 | 28         | 11.3 | 29   | 15   | 2    | -15  | -35  |
| 19  | 13.9 | 29         | 10.7 | 28   | 13   | -1   | -20  | ---  |
| 20  | 13.3 | 30         | 10.2 | 27   | 11   | -4   | -24  | ---  |
| 21  | 13.2 | 30         | 9.9  | 26   | 10   | -5   | -26  | ---  |
| 22  | 13.8 | 30         | 10.3 | 28   | 13   | -1   | -20  | ---  |
| 23  | 14.0 | 26         | 10.7 | 26   | 13   | 0    | -18  | -38  |
| 24  | 13.6 | 22         | 10.3 | 21   | 10   | -2   | -20  | -39  |

| EASTERN AUSTRALIA |      |     |      |      |      |      |      |      |    |  |  |  |  | SOUTHERN AUSTRALIA |     |      |     |      |      |      |      |      |      |  |  |  |  | WESTERN AUSTRALIA |    |      |      |      |      |      |      |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
|-------------------|------|-----|------|------|------|------|------|------|----|--|--|--|--|--------------------|-----|------|-----|------|------|------|------|------|------|--|--|--|--|-------------------|----|------|------|------|------|------|------|------|------|------|----|--|--|--|--|--|--|--|--|--|--|
| Asia              |      |     |      |      |      |      |      |      |    |  |  |  |  | Asia               |     |      |     |      |      |      |      |      |      |  |  |  |  | Asia              |    |      |      |      |      |      |      |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
| UTC               | MUF  | dBu | FOT  | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |    |  |  |  |  |                    | UTC | MUF  | dBu | FOT  | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |  |  |  |  |                   |    | UTC  | MUF  | dBu  | FOT  | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |    |  |  |  |  |  |  |  |  |  |  |
| 1                 | 26.4 | 14  | 21.0 | 13   | 19   | 19   | 16   | 11   |    |  |  |  |  |                    | 1   | 21.0 | 11  | 16.8 | 8    | 12   | 11   | 5    | -2   |  |  |  |  |                   |    | 1    | 24.3 | 15   | 19.3 | 15   | 20   | 18   | 14   | 7    |    |  |  |  |  |  |  |  |  |  |  |
| 2                 | 26.6 | 13  | 20.5 | 11   | 18   | 18   | 15   | 10   |    |  |  |  |  |                    | 2   | 21.3 | 11  | 17.3 | 6    | 12   | 11   | 6    | -1   |  |  |  |  |                   |    | 2    | 24.6 | 14   | 19.8 | 13   | 18   | 18   | 14   | 8    |    |  |  |  |  |  |  |  |  |  |  |
| 3                 | 27.2 | 12  | 21.2 | 11   | 18   | 18   | 15   | 10   |    |  |  |  |  |                    | 3   | 21.7 | 11  | 18.0 | 5    | 12   | 11   | 7    | 0    |  |  |  |  |                   |    | 3    | 25.5 | 14   | 19.9 | 11   | 18   | 18   | 14   | 9    |    |  |  |  |  |  |  |  |  |  |  |
| 4                 | 27.8 | 13  | 21.1 | 11   | 19   | 19   | 16   | 12   |    |  |  |  |  |                    | 4   | 21.8 | 11  | 18.0 | 6    | 12   | 11   | 7    | 0    |  |  |  |  |                   |    | 4    | 26.4 | 13   | 20.0 | 11   | 18   | 18   | 15   | 9    |    |  |  |  |  |  |  |  |  |  |  |
| 5                 | 28.5 | 13  | 21.7 | 14   | 20   | 21   | 18   | 13   |    |  |  |  |  |                    | 5   | 21.6 | 11  | 17.8 | 7    | 13   | 12   | 7    | 0    |  |  |  |  |                   |    | 5    | 27.0 | 13   | 20.5 | 12   | 19   | 19   | 16   | 11   |    |  |  |  |  |  |  |  |  |  |  |
| 6                 | 28.3 | 16  | 22.5 | 17   | 23   | 23   | 20   | 15   |    |  |  |  |  |                    | 6   | 21.4 | 12  | 17.5 | 10   | 14   | 12   | 7    | 0    |  |  |  |  |                   |    | 6    | 27.7 | 14   | 21.1 | 14   | 20   | 20   | 18   | 13   |    |  |  |  |  |  |  |  |  |  |  |
| 7                 | 27.3 | 17  | 22.2 | 22   | 25   | 24   | 20   | 15   |    |  |  |  |  |                    | 7   | 21.1 | 14  | 17.2 | 14   | 16   | 13   | 7    | -1   |  |  |  |  |                   |    | 7    | 27.4 | 16   | 21.9 | 17   | 23   | 22   | 19   | 14   |    |  |  |  |  |  |  |  |  |  |  |
| 8                 | 26.2 | 19  | 21.9 | 29   | 29   | 26   | 21   | 14   |    |  |  |  |  |                    | 8   | 20.7 | 16  | 16.8 | 20   | 19   | 15   | 7    | -2   |  |  |  |  |                   |    | 8    | 26.8 | 17   | 21.9 | 22   | 25   | 24   | 20   | 14   |    |  |  |  |  |  |  |  |  |  |  |
| 9                 | 25.2 | 21  | 20.3 | 38   | 34   | 34   | 29   | 22   | 13 |  |  |  |  |                    | 9   | 20.0 | 21  | 16.2 | 31   | 25   | 18   | 8    | -4   |  |  |  |  |                   |    | 9    | 25.9 | 19   | 21.1 | 30   | 29   | 26   | 21   | 14   |    |  |  |  |  |  |  |  |  |  |  |
| 10                | 24.1 | 22  | 19.3 | 40   | 34   | 34   | 28   | 20   | 11 |  |  |  |  |                    | 10  | 19.1 | 23  | 15.4 | 35   | 26   | 17   | 5    | -9   |  |  |  |  |                   |    | 10   | 24.9 | 22   | 20.8 | 40   | 35   | 30   | 22   | 13   |    |  |  |  |  |  |  |  |  |  |  |
| 11                | 23.3 | 23  | 18.6 | 41   | 34   | 34   | 28   | 19   | 8  |  |  |  |  |                    | 11  | 18.2 | 24  | 14.6 | 35   | 24   | 14   | 1    | -14  |  |  |  |  |                   |    | 11   | 23.9 | 23   | 19.3 | 42   | 35   | 29   | 20   | 11   |    |  |  |  |  |  |  |  |  |  |  |
| 12                | 23.0 | 23  | 18.3 | 42   | 35   | 35   | 28   | 18   | 8  |  |  |  |  |                    | 12  | 17.2 | 25  | 13.8 | 34   | 22   | 11   | -4   | -21  |  |  |  |  |                   |    | 12   | 22.9 | 23   | 18.4 | 42   | 35   | 27   | 18   | 7    |    |  |  |  |  |  |  |  |  |  |  |
| 13                | 22.5 | 24  | 17.8 | 43   | 35   | 35   | 27   | 16   | 6  |  |  |  |  |                    | 13  | 16.7 | 26  | 13.2 | 33   | 20   | 8    | -8   | -26  |  |  |  |  |                   |    | 13   | 22.0 | 24   | 17.6 | 42   | 34   | 26   | 15   | 4    |    |  |  |  |  |  |  |  |  |  |  |
| 14                | 21.8 | 23  | 16.9 | 42   | 33   | 35   | 25   | 14   | 2  |  |  |  |  |                    | 14  | 16.1 | 26  | 12.7 | 32   | 18   | 5    | -12  | -32  |  |  |  |  |                   |    | 14   | 21.6 | 24   | 17.2 | 42   | 33   | 25   | 14   | 2    |    |  |  |  |  |  |  |  |  |  |  |
| 15                | 20.3 | 24  | 15.9 | 40   | 31   | 31   | 21   | 9    | -4 |  |  |  |  |                    | 15  | 15.5 | 26  | 12.2 | 31   | 16   | 2    | -17  | -38  |  |  |  |  |                   |    | 15   | 21.1 | 24   | 16.7 | 42   | 32   | 24   | 12   | 0    |    |  |  |  |  |  |  |  |  |  |  |
| 16                | 18.9 | 25  | 14.7 | 38   | 28   | 17   | 4    | -11  |    |  |  |  |  |                    | 16  | 14.8 | 26  | 11.5 | 28   | 12   | -2   | -23  | .... |  |  |  |  |                   |    | 16   | 20.4 | 24   | 15.7 | 40   | 30   | 21   | 9    | -5   |    |  |  |  |  |  |  |  |  |  |  |
| 17                | 17.3 | 26  | 13.4 | 36   | 23   | 12   | -3   | -21  |    |  |  |  |  |                    | 17  | 14.0 | 27  | 10.9 | 26   | 8    | -8   | -30  | .... |  |  |  |  |                   |    | 17   | 19.1 | 24   | 14.8 | 38   | 27   | 17   | 3    | -12  |    |  |  |  |  |  |  |  |  |  |  |
| 18                | 15.9 | 25  | 12.2 | 31   | 16   | 2    | -17  | -38  |    |  |  |  |  |                    | 18  | 13.3 | 27  | 10.2 | 23   | 4    | -14  | -39  | .... |  |  |  |  |                   |    | 18   | 17.9 | 24   | 13.8 | 36   | 23   | 11   | -4   | -21  |    |  |  |  |  |  |  |  |  |  |  |
| 19                | 12.9 | 26  | 9.9  | 20   | -1   | -21  | .... | .... |    |  |  |  |  |                    | 19  | 11.3 | 25  | 8.7  | 8    | -19  | .... | .... | .... |  |  |  |  |                   |    | 19   | 16.0 | 24   | 12.3 | 31   | 15   | 0    | -19  | .... |    |  |  |  |  |  |  |  |  |  |  |
| 20                | 12.0 | 26  | 9.3  | 15   | -8   | -30  | .... | .... |    |  |  |  |  |                    | 20  | 10.6 | 25  | 8.2  | 3    | -27  | .... | .... | .... |  |  |  |  |                   |    | 20   | 12.9 | 25   | 9.9  | 18   | -4   | -25  | .... |      |    |  |  |  |  |  |  |  |  |  |  |
| 21                | 15.8 | 20  | 11.9 | 24   | 12   | 0    | -18  | -39  |    |  |  |  |  |                    | 21  | 14.0 | 18  | 10.6 | 18   | 2    | -14  | -36  | .... |  |  |  |  |                   |    | 21   | 12.0 | 25   | 9.3  | 14   | -12  | -36  | .... |      |    |  |  |  |  |  |  |  |  |  |  |
| 22                | 22.4 | 16  | 17.4 | 25   | 23   | 19   | 10   | 0    |    |  |  |  |  |                    | 22  | 17.8 | 16  | 13.5 | 20   | 16   | 8    | -3   | -16  |  |  |  |  |                   |    | 22   | 15.7 | 21   | 12.2 | 26   | 12   | -2   | -21  | .... |    |  |  |  |  |  |  |  |  |  |  |
| 23                | 25.0 | 16  | 19.9 | 20   | 23   | 21   | 16   | 9    |    |  |  |  |  |                    | 23  | 19.8 | 14  | 15.3 | 15   | 15   | 11   | 4    | -6   |  |  |  |  |                   |    | 23   | 21.2 | 17   | 16.4 | 24   | 22   | 17   | 9    | -1   |    |  |  |  |  |  |  |  |  |  |  |
| 24                | 25.3 | 15  | 20.5 | 15   | 20   | 19   | 15   | 9    |    |  |  |  |  |                    | 24  | 20.6 | 12  | 16.2 | 10   | 14   | 11   | 5    | -3   |  |  |  |  |                   |    | 24   | 23.7 | 16   | 18.5 | 20   | 22   | 19   | 14   | 6    |    |  |  |  |  |  |  |  |  |  |  |
|                   |      |     |      |      |      |      |      |      |    |  |  |  |  |                    |     |      |     |      |      |      |      |      |      |  |  |  |  |                   |    |      |      |      |      |      |      |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
| South Pacific     |      |     |      |      |      |      |      |      |    |  |  |  |  | South Pacific      |     |      |     |      |      |      |      |      |      |  |  |  |  | South Pacific     |    |      |      |      |      |      |      |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
| UTC               | MUF  | dBu | FOT  | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |    |  |  |  |  |                    | UTC | MUF  | dBu | FOT  | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |  |  |  |  |                   |    | UTC  | MUF  | dBu  | FOT  | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |    |  |  |  |  |  |  |  |  |  |  |
| 1                 | 27.8 | 26  | 23.0 | 33   | 35   | 34   | 30   | 25   |    |  |  |  |  |                    | 1   | 19.1 | 16  | 15.4 | 19   | 17   | 11   | 2    | -10  |  |  |  |  |                   |    | 1    | 22.9 | 12   | 18.2 | 9    | 15   | 14   | 10   | 3    |    |  |  |  |  |  |  |  |  |  |  |
| 2                 | 28.4 | 26  | 23.3 | 33   | 36   | 34   | 31   | 26   |    |  |  |  |  |                    | 2   | 19.2 | 16  | 15.8 | 19   | 17   | 12   | 2    | -10  |  |  |  |  |                   |    | 2    | 23.1 | 12   | 18.7 | 9    | 15   | 14   | 10   | 3    |    |  |  |  |  |  |  |  |  |  |  |
| 3                 | 28.4 | 27  | 23.3 | 34   | 36   | 35   | 31   | 27   |    |  |  |  |  |                    | 3   | 19.1 | 16  | 15.7 | 20   | 18   | 12   | 2    | -10  |  |  |  |  |                   |    | 3    | 23.3 | 13   | 17.3 | 10   | 15   | 15   | 10   | 4    |    |  |  |  |  |  |  |  |  |  |  |
| 4                 | 28.1 | 27  | 23.0 | 36   | 37   | 35   | 32   | 27   |    |  |  |  |  |                    | 4   | 19.0 | 17  | 15.5 | 21   | 19   | 12   | 2    | -10  |  |  |  |  |                   |    | 4    | 23.3 | 13   | 19.1 | 11   | 16   | 15   | 11   | 4    |    |  |  |  |  |  |  |  |  |  |  |
| 5                 | 27.4 | 28  | 22.3 | 38   | 38   | 36   | 32   | 26   |    |  |  |  |  |                    | 5   | 18.8 | 18  | 15.4 | 24   | 20   | 13   | 2    | -11  |  |  |  |  |                   |    | 5    | 23.0 | 14   | 18.9 | 14   | 18   | 16   | 11   | 4    |    |  |  |  |  |  |  |  |  |  |  |
| 6                 | 26.6 | 29  | 21.6 | 42   | 40   | 37   | 32   | 26   |    |  |  |  |  |                    | 6   | 18.6 | 20  | 15.2 | 27   | 21   | 13   | 1    | -12  |  |  |  |  |                   |    | 6    | 22.9 | 15   | 18.7 | 18   | 20   | 18   | 12   | 4    |    |  |  |  |  |  |  |  |  |  |  |
| 7                 | 25.5 | 31  | 20.6 | 47   | 43   | 38   | 32   | 25   |    |  |  |  |  |                    | 7   | 18.4 | 23  | 14.9 | 32   | 24   | 14   | 1    | -13  |  |  |  |  |                   |    | 7    | 22.6 | 18   | 18.4 | 24   | 24   | 20   | 13   | 4    |    |  |  |  |  |  |  |  |  |  |  |
| 8                 | 24.3 | 33  | 19.6 | 49   | 44   | 39   | 31   | 23   |    |  |  |  |  |                    | 8   | 17.9 | 26  | 14.5 | 36   | 25   | 14   | 0    | -17  |  |  |  |  |                   |    | 8    | 22.3 | 20   | 18.1 | 31   | 27   | 22   | 14   | 4    |    |  |  |  |  |  |  |  |  |  |  |
| 9                 | 23.4 | 34  | 18.6 | 49   | 43   | 38   | 30   | 21   |    |  |  |  |  |                    | 9   | 17.1 | 28  | 13.8 | 36   | 23   | 12   | -4   | -22  |  |  |  |  |                   |    | 9    | 21.5 | 22   | 17.3 | 35   | 30   | 23   | 14   | 4    |    |  |  |  |  |  |  |  |  |  |  |
| 10                | 22.1 | 34  | 17.6 | 49   | 43   | 36   | 28   | 18   |    |  |  |  |  |                    | 10  | 16.2 | 28  | 13.0 | 35   | 21   | 8    | -9   | -29  |  |  |  |  |                   |    | 10   | 20.5 | 24   | 16.4 | 38   | 30   | 22   | 12   | 0    |    |  |  |  |  |  |  |  |  |  |  |
| 11                | 21.5 | 35  | 17.1 | 49   | 42   | 36   | 26   | 16   |    |  |  |  |  |                    | 11  | 15.3 | 29  | 12.2 | 33   | 18   | 4    | -6   | -37  |  |  |  |  |                   |    | 11   | 19.4 | 26   | 15.5 | 38   | 29   | 20   | 9    | -4   |    |  |  |  |  |  |  |  |  |  |  |
| 12                | 20.8 | 36  | 16.4 | 49   | 42   | 35   | 25   | 14   |    |  |  |  |  |                    | 12  | 14.7 | 30  | 11.7 | 32   | 15   | 0    | -21  | .... |  |  |  |  |                   |    | 12   | 18.5 | 27   | 14.8 | 38   | 28   | 18   | 5    | -9   |    |  |  |  |  |  |  |  |  |  |  |
| 13                | 20.0 | 36  | 15.7 | 48   | 40   | 33   | 23   | 11   |    |  |  |  |  |                    | 13  | 14.1 | 30  | 11.2 | 30   | 13   | -3   | -26  | .... |  |  |  |  |                   |    | 13   | 17.7 | 28   | 14.1 | 37   | 26   | 16   | 2    | -13  |    |  |  |  |  |  |  |  |  |  |  |
| 14                | 18.8 | 37  | 14.7 | 47   | 39   | 30   | 19   | 7    |    |  |  |  |  |                    | 14  | 13.6 | 31  | 10.7 | 28   | 10   | -7   | -31  | .... |  |  |  |  |                   |    | 14   | 17.0 | 28   | 13.5 | 37   | 25   | 14   | 0    | -17  |    |  |  |  |  |  |  |  |  |  |  |
| 15                | 17.7 | 38  | 13.7 | 46   | 37   | 27   | 15   | 2    |    |  |  |  |  |                    | 15  | 12.9 | 31  | 10.1 | 26   | 6    | -12  | -37  | .... |  |  |  |  |                   |    | 15   | 16.4 | 29   | 12.8 | 35   | 23   | 12   | -3   | -21  |    |  |  |  |  |  |  |  |  |  |  |
| 16                | 16.5 | 39  | 12.6 | 45   | 34   | 24   | 10   | -3   |    |  |  |  |  |                    | 16  | 12.3 | 32  | 9.5  | 23   | 2    | -17  | .... |      |  |  |  |  |                   | 16 | 15.7 | 29   | 12.1 | 34   | 21   | 9    | -7   | -26  |      |    |  |  |  |  |  |  |  |  |  |  |
| 17                | 15.5 | 40  | 11.8 | 43   | 31   | 21   | 6    | -8   |    |  |  |  |  |                    | 17  | 11.8 | 33  | 9.0  | 21   | -1   | -23  | .... |      |  |  |  |  |                   | 17 | 14.9 | 30   | 11.4 | 33   | 19   | 6    | -12  | -31  |      |    |  |  |  |  |  |  |  |  |  |  |
| 18                | 15.8 | 38  | 12.0 | 42   | 31   | 21   | 7    | -6   |    |  |  |  |  |                    | 18  | 11.6 | 30  | 8.8  | 18   | -3   | -24  | .... |      |  |  |  |  |                   | 18 | 14.3 | 30   | 10.9 | 30   | 16   | 2    | -16  | -37  |      |    |  |  |  |  |  |  |  |  |  |  |
| 19                | 18.2 | 33  | 13.6 | 39   | 33   | 26   | 15   | 3    |    |  |  |  |  |                    | 19  | 12.1 | 23  | 9.1  | 17   | 0    | -18  | .... |      |  |  |  |  |                   | 19 | 14.1 | 24   | 10.6 | 24   | 12   | 0    | -17  | -37  |      |    |  |  |  |  |  |  |  |  |  |  |
| 20                | 21.6 | 30  | 16.4 | 37   | 35   | 31   | 23   | 14   |    |  |  |  |  |                    | 20  | 13.7 | 18  | 10.1 | 17   | 6    | -7   | -26  | .... |  |  |  |  |                   |    | 20   | 14.7 | 20   | 11.0 | 20   | 12   | 2    | -13  | -30  |    |  |  |  |  |  |  |  |  |  |  |
| 21                | 24.3 | 28  | 18.8 | 36   | 35   | 33   | 27   | 20   |    |  |  |  |  |                    | 21  | 15.8 | 17  | 11.9 | 19   | 12   | 2    | -12  | -29  |  |  |  |  |                   |    | 21   | 16.7 | 16   | 13.2 | 18   | 14   | 7    | -4   | -17  |    |  |  |  |  |  |  |  |  |  |  |
| 22                | 25.3 | 27  | 19.9 | 34   | 35   | 33   | 28   | 22   |    |  |  |  |  |                    | 22  | 17.5 | 16  | 13.4 | 20   | 15   | 8    | -4   | -18  |  |  |  |  |                   |    | 22   | 19.3 | 14   | 14.6 | 14   | 15   | 11   | 3    | -6   |    |  |  |  |  |  |  |  |  |  |  |
| 23                | 25.8 | 27  | 20.6 | 33   | 34   | 32   | 28   | 22   |    |  |  |  |  |                    | 23  | 18.4 | 16  | 14.4 | 19   | 17   | 10   | 0    | -13  |  |  |  |  |                   |    | 23   | 21.4 | 13   | 16.5 | 12   | 16   | 14   | 8    | 0    |    |  |  |  |  |  |  |  |  |  |  |
| 24                | 26.7 | 27  | 21.8 | 32   | 34   | 33   | 29   | 24   |    |  |  |  |  |                    | 24  | 18.8 | 16  | 14.9 | 19   | 17   | 11   | 1    | -11  |  |  |  |  |                   |    | 24   | 22.5 | 13   | 17.6 | 10   | 15   | 14   | 9    | 2    |    |  |  |  |  |  |  |  |  |  |  |
|                   |      |     |      |      |      |      |      |      |    |  |  |  |  |                    |     |      |     |      |      |      |      |      |      |  |  |  |  |                   |    |      |      |      |      |      |      |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
| USA/Caribbean     |      |     |      |      |      |      |      |      |    |  |  |  |  | USA/Caribbean      |     |      |     |      |      |      |      |      |      |  |  |  |  | USA/Caribbean     |    |      |      |      |      |      |      |      |      |      |    |  |  |  |  |  |  |  |  |  |  |
| UTC               | MUF  | dBu | FOT  | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |    |  |  |  |  |                    | UTC | MUF  | dBu | FOT  | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |  |  |  |  |                   |    | UTC  | MUF  | dBu  | FOT  | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |    |  |  |  |  |  |  |  |  |  |  |
| 1                 | 15.4 | 5   | 15.1 | 2    | 5    | 3    | 0    | -7   |    |  |  |  |  |                    | 1   | 21.5 | 5   | 16.2 | -4   | 6    | 3    | 3    | -3   |  |  |  |  |                   |    | 1    | 19.8 | 3    | 14.9 | -10  | 1    | 3    | 1    | -4   |    |  |  |  |  |  |  |  |  |  |  |
| 2                 | 17.8 | 5   | 13.4 | 2    | 5    | 3    | 4    | -14  |    |  |  |  |  |                    | 2   | 19.3 | 6   | 14.6 | -1   | 7    | 5    | 0    | -9   |  |  |  |  |                   |    | 2    | 17.6 | 3    | 13.3 | -5   | 3    | 3    | -2   | -10  |    |  |  |  |  |  |  |  |  |  |  |
| 3                 | 15.9 | 7   | 12.0 | 6    | 5    | 0    | -10  | -23  |    |  |  |  |  |                    | 3   | 17.4 | 8   | 13.2 | 6    | 8    | 4    | -4   | -15  |  |  |  |  |                   |    | 3    | 15.6 | 2    | 11.8 | -1   | 3    | 1    | -6   | -17  |    |  |  |  |  |  |  |  |  |  |  |
| 4                 | 14.6 | 10  | 10.0 | 10   | 5    | -3   | -16  | -33  |    |  |  |  |  |                    | 4   | 16.1 | 10  | 12.1 | 10   | 8    | 2    | -9   | -23  |  |  |  |  |                   |    | 4    | 14.3 | 3    | 10.7 | 3    | 4    | -1   | -11  | -24  | </ |  |  |  |  |  |  |  |  |  |  |

## LONG PATH

### EASTERN AUSTRALIA

| Europe | UTC  | MUF | dBU  | FOT | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |
|--------|------|-----|------|-----|------|------|------|------|------|
| 1      | 9.9  | -12 | 7.4  | 0   | -5   | -14  | -29  | ...  | ...  |
| 2      | 10.2 | -6  | 7.7  | 1   | -5   | -15  | -31  | ...  | ...  |
| 3      | 10.4 | -2  | 8.0  | 3   | -4   | -15  | -33  | ...  | ...  |
| 4      | 9.9  | 0   | 7.7  | 3   | -7   | -20  | -39  | ...  | ...  |
| 5      | 9.0  | 4   | 7.0  | 2   | -12  | -29  | ...  | ...  | ...  |
| 6      | 8.9  | 11  | 7.0  | 2   | -16  | -35  | ...  | ...  | ...  |
| 7      | 10.4 | 20  | 8.3  | 10  | -7   | -24  | ...  | ...  | ...  |
| 8      | 13.7 | 23  | 10.9 | 22  | 9    | -4   | -22  | ...  | ...  |
| 9      | 14.6 | 24  | 11.2 | 25  | 15   | 5    | -8   | -24  | ...  |
| 10     | 14.4 | 15  | 10.9 | 15  | 10   | 3    | -9   | -23  | ...  |
| 11     | 17.3 | 9   | 13.7 | 6   | 9    | 6    | 0    | -9   | ...  |
| 12     | 16.6 | 3   | 13.1 | -2  | 4    | 2    | -3   | -11  | ...  |
| 13     | 15.9 | -3  | 12.8 | -8  | 0    | 0    | -4   | -12  | ...  |
| 14     | 15.1 | -8  | 11.8 | -11 | -2   | -1   | -6   | -13  | ...  |
| 15     | 14.4 | -12 | 11.1 | -13 | -3   | -2   | -7   | -14  | ...  |
| 16     | 13.8 | -15 | 10.5 | -13 | -3   | -3   | -7   | -15  | ...  |
| 17     | 13.6 | -16 | 10.2 | -13 | -3   | -3   | -8   | -16  | ...  |
| 18     | 14.2 | -14 | 10.6 | -14 | -3   | -3   | -7   | -14  | ...  |
| 19     | 16.1 | -8  | 12.7 | -15 | -4   | -2   | -5   | -12  | ...  |
| 20     | 14.3 | -11 | 11.1 | -11 | -3   | -3   | -8   | -17  | ...  |
| 21     | 14.4 | -14 | 9.5  | -7  | -2   | -5   | -13  | -24  | ...  |
| 22     | 11.1 | -17 | 8.5  | -4  | -2   | -7   | -18  | -31  | ...  |
| 23     | 10.3 | -17 | 7.8  | -2  | -3   | -10  | -22  | -37  | ...  |
| 24     | 9.9  | -16 | 7.5  | -1  | -4   | -12  | -26  | ...  | ...  |

### SOUTHERN AUSTRALIA

| Europe | UTC  | MUF | dBU  | FOT | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |
|--------|------|-----|------|-----|------|------|------|------|------|
| 1      | 9.5  | -14 | 7.2  | 0   | -6   | -16  | -33  | ...  | ...  |
| 2      | 9.7  | -8  | 7.5  | 0   | -7   | -18  | -36  | ...  | ...  |
| 3      | 9.8  | -3  | 7.6  | 1   | -8   | -21  | ...  | ...  | ...  |
| 4      | 9.4  | 0   | 7.3  | 1   | -11  | -26  | ...  | ...  | ...  |
| 5      | 8.5  | 2   | 6.7  | 1   | -18  | -37  | ...  | ...  | ...  |
| 6      | 8.3  | 8   | 6.6  | 2   | -23  | ...  | ...  | ...  | ...  |
| 7      | 9.6  | 16  | 7.6  | 4   | -16  | -36  | ...  | ...  | ...  |
| 8      | 12.3 | 22  | 9.8  | 16  | 0    | -15  | -37  | ...  | ...  |
| 9      | 15.8 | 21  | 12.4 | 25  | 14   | 3    | -12  | -29  | ...  |
| 10     | 12.9 | 21  | 9.9  | 18  | 6    | -7   | -25  | ...  | ...  |
| 11     | 12.0 | 13  | 9.2  | 11  | 1    | -11  | -29  | ...  | ...  |
| 12     | 15.4 | 10  | 10.7 | 9   | 8    | 2    | -8   | -20  | ...  |
| 13     | 14.8 | 2   | 10.5 | 1   | 3    | 0    | -8   | -18  | ...  |
| 14     | 14.1 | -5  | 9.8  | -5  | 0    | -2   | -9   | -19  | ...  |
| 15     | 13.5 | -11 | 9.4  | -8  | -2   | -3   | -9   | -19  | ...  |
| 16     | 13.1 | -14 | 9.2  | -10 | -2   | -3   | -10  | -19  | ...  |
| 17     | 13.1 | -16 | 9.2  | -11 | -3   | -4   | -9   | -18  | ...  |
| 18     | 13.8 | -14 | 9.8  | -12 | -3   | -3   | -8   | -16  | ...  |
| 19     | 15.4 | -9  | 10.6 | -14 | -3   | -3   | -7   | -15  | ...  |
| 20     | 13.3 | -14 | 10.4 | -10 | -3   | -4   | -10  | -20  | ...  |
| 21     | 11.5 | -24 | 8.9  | -10 | -6   | -10  | -19  | -32  | ...  |
| 22     | 10.3 | -33 | 8.0  | -12 | -11  | -18  | -30  | ...  | ...  |
| 23     | 9.6  | -32 | 7.4  | -9  | -11  | -20  | -34  | ...  | ...  |
| 24     | 9.4  | -22 | 7.2  | -3  | -8   | -17  | -33  | ...  | ...  |

### WESTERN AUSTRALIA

| Europe | UTC  | MUF | dBU  | FOT | 14.2 | 18.1 | 21.2 | 24.9 | 28.5 |
|--------|------|-----|------|-----|------|------|------|------|------|
| 1      | 9.2  | -38 | 7.0  | -12 | -16  | -25  | ...  | ...  | ...  |
| 2      | 9.4  | -20 | 7.3  | -3  | -7   | -16  | -31  | ...  | ...  |
| 3      | 9.5  | -15 | 7.4  | -2  | -8   | -18  | -35  | ...  | ...  |
| 4      | 9.1  | -14 | 7.1  | -2  | -10  | -22  | ...  | ...  | ...  |
| 5      | 8.2  | -14 | 6.4  | -3  | -15  | -30  | ...  | ...  | ...  |
| 6      | 8.0  | -10 | 6.3  | -4  | -19  | -36  | ...  | ...  | ...  |
| 7      | 9.2  | 1   | 7.3  | -1  | -15  | -32  | ...  | ...  | ...  |
| 8      | 11.6 | 10  | 9.2  | 7   | -5   | -18  | -37  | ...  | ...  |
| 9      | 14.8 | 14  | 11.9 | 15  | 6    | -3   | -18  | -34  | ...  |
| 10     | 14.8 | 17  | 11.5 | 18  | 9    | 0    | -13  | -29  | ...  |
| 11     | 12.3 | 15  | 9.5  | 12  | 1    | -11  | -29  | ...  | ...  |
| 12     | 12.0 | 7   | 9.2  | 7   | -1   | -11  | -27  | ...  | ...  |
| 13     | 15.8 | 4   | 10.9 | 3   | 4    | 0    | -8   | -19  | ...  |
| 14     | 15.3 | -2  | 10.4 | -4  | 0    | -2   | -8   | -17  | ...  |
| 15     | 14.6 | -9  | 10.1 | -10 | -3   | -4   | -9   | -18  | ...  |
| 16     | 14.0 | -13 | 9.5  | -12 | -4   | -5   | -10  | -19  | ...  |
| 17     | 13.3 | -17 | 9.1  | -13 | -5   | -6   | -11  | -19  | ...  |
| 18     | 12.9 | -19 | 8.9  | -13 | -5   | -6   | -11  | -20  | ...  |
| 19     | 12.9 | -20 | 8.9  | -14 | -5   | -6   | -11  | -20  | ...  |
| 20     | 12.7 | -19 | 9.4  | -12 | -5   | -7   | -13  | -23  | ...  |
| 21     | 10.8 | -25 | 8.6  | -22 | -16  | -20  | -30  | ...  | ...  |
| 22     | 9.8  | -27 | 7.7  | -25 | -31  | ...  | ...  | ...  | ...  |
| 23     | 9.3  | -27 | 7.2  | -26 | -34  | ...  | ...  | ...  | ...  |
| 24     | 9.0  | -20 | 7.0  | -21 | -33  | ...  | ...  | ...  | ...  |

## IARUMS — Intruder Watch

Gordon Loveday VK4KAL Federal Intruder Watch Co-ordinator  
Freeport No 4 Rubyvale Qld 4702 or VK4KAL@VK4UN-1

Review time has caught up again. The most blatant infringement still comes from USSR (now CIS). A letter from DoTC to VK2COP in Feb 1985 stated, quote "the USSR has agreed to remove intruder UMS (Moscow Naval Radio) from 21.032 and 14.141 MHz". We are still reporting this intruder, so how much notice can we take of their word? UMS still rates the most intrusions per year.

It also appears that I have upset some amateurs by stating "I welcome observations from all amateurs whether they are members of the WIA or not". I make no apologies for that, I would like to direct those persons to the article in October issue of "AR", page 5, 1st column, 2nd last paragraph! I like to think amateur radio has a broader outlook on its activities. I welcome observations without exception.

Section 5 of the Monitoring System Manual covers many subjects, including Personnel, Equipment, Hours of Work, Types of Monitoring, Bands etc, 10 sections.

Let me comment on "hours of work". Monitors must be able to put aside two or three hours minimum per week. Less than this results in loss of familiarity with the patterns of activity on the bands being monitored.

Types of monitoring, general coverage and specific. Some monitors are experts in

a particular mode viz, A1A (CW) or F1B (RTTY). These persons should be encouraged as the "obs" ends up with an intimate knowledge of that band. It is a pity that the manual is 25mm thick. It offers help in decoding A1A text in Arabic, Turkish, Hebrew and Cyrillic Russian.

My thanks to those who participated in the IBF Survey, the outcome will be published in due course.

I hope Christmas 1992 was happy to your QTH.

73 VK4KAL  
ar

## Stolen Equipment

Stolen during the 1st week of December 1992, from the radio shack of VK3MT/VK3COT, at the Royal Melbourne Institute of Technology (RMIT), City Campus, 124 Latrobe Street, Melbourne, ICOM IC734 HF Transceiver, with Power Supply and handset. IC734 Serial No 06196, Power Supply Serial No 0180.

The transceiver is engraved on the heatsink inside the set, and on the bottom of the top cover.

Please contact John Tobin at RMIT Security (03) 660 2490. Information from Craig Cook VK3CMC (03) 660 4345 (B.Hrs), Fax (03) 662 2525.

★ ★ ★ ★

Stolen on 27th November 1992 from Signal Hill at Goulburn, NSW, Goulburn Amateur Radio Society Inc :-

Pac-Comm Tiny 2 Terminal Node Controller, S/N T5782.

Pac-Comm Tiny 2 Terminal Node Controller, S/N T6784.

YAESU UHF Transceiver model FT712, S/N 81120576.

Phillips FM828 transceiver, S/N 42459.

Power Supply, unidentified, known as FRY1501.

Please contact Goulburn Police (048) 21 2344, or (048) 21 2534.

Purchasers of used amateur radio equipment are requested to be alert for signs of removal of Serial or ID numbering.

★ ★ ★ ★

ICOM IC730 HF Transceiver S/N 13814689, from the radio shack of Royal Melbourne Institute of Technology (RMIT) approx 5th Nov 1992. May have RMIT ident engraved thereon, or a small aluminium label pop-riveted with appropriate words of ownership. Stolen with microphone, but DC power cord left behind. Contact John Tobin at RMIT Security (03) 660 2490, or Craig Cook VK3CMC (03) 660 4345 (B Hrs).

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# Awards

John Kelleher VK3DP Federal Awards Manager

## DXCC Profile Stuart Millowick VK5MS



Stuart Millowick VK5MS, 1991.

Stuart became interested in amateur radio in 1934 as a schoolboy.

He assisted George Chandler VK3AC with his Sunday broadcasts on the 200 metre band. He also constructed several short-wave receivers, listening to overseas broadcasts. That is when the DX bug bit him.

In 1940 he completed his electrical apprenticeship, moving to Mount Gambier via Penola. He obtained his AOCIP in June 1947 and came on air in September that year. Stuart conducted experiments with John Sheard VK5JA on two metres. Prior to 1950 when 240v was installed, he utilised a 12 volt generator and petrol engine for power. He built a new rig using an 815 pa, plate modulated with 807's for around 50 watts input. His receiver was an Eddystone 640. This gear was updated around 1953 and a brand new home brew 3 element beam for 20 metres DX was really boom-



Stuart in the early days of his Amateur Radio activities, with his mainly home brew equipment.

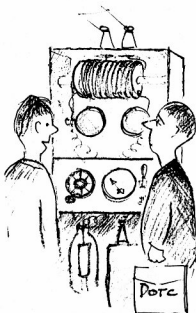
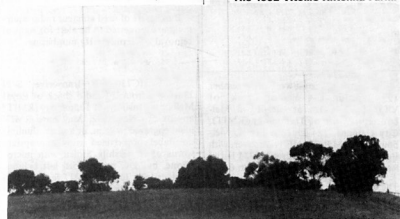
ing around 1963 and Stuart became the first VK station to confirm 300 countries on AM. In the 1960's he acquired a new FT-100 and retired the old gear. On the 14th November 1966, he was made a member of the ARRL DXCC honour roll. On a visit to the USA in 1968 he purchased a Drake Line TR3-R4A, T4XB/R4B. This equipment is still in use.

His advice to those aspiring to higher levels of DXCC is.....

- (1) Set yourself a reasonable progressive total.
- (2) Don't be in too much of a hurry.
- (3) Spend a lot of time listening.
- (4) Try working often in contests to hone your operating skills.
- (5) Make sure that your equipment is reliable and accurate.
- (6) Always abide by good operating skills and etiquette.
- (7) Remember your family responsibilities, and keep within your working finances.

ar

### The 1992 VK5MS Antenna Farm.



"But the chap said — just tune it up for maximum spark and it would go like a rocket on all bands. It's good for the ozone layer too."

## ELECTRONIC DISPOSALS

27 THE MALL  
SOUTH CROYDON

### Specials:

3 watt ceramic resistors 10c each  
40 amp 12 V relays single throw \$4  
5A Bi Metal cut outs 35c each  
CB/10m end fed mobile ant comes complete with coax and mount \$12.00

Mains caps 240 v \$1.00 each  
ECL — ICs 10.000 series \$3.50 per tube

2716 70c each or \$10 per tube  
9016 16k x \$12 per tube  
TL082 Low noise op amp \$1 each  
10 µF 40 v low leakage Electrolytics \$6 per 100

2200 µF 50 V axial 90c each plus lots components at reduced rates.

KITS (OR PARTS, BOARD, ETC.)  
AVAILABLE FOR DREW DIAMOND'S  
PROJECTS

# CONTESTS

**Peter Nesbit VK3APN — Federal Contest Coordinator**  
24 Sovereign Way, Avondale Heights, 3034.

## Contest Calendar Jan-Mar 93

Rules, where already published, are in the indicated issue.

|                |                                    |
|----------------|------------------------------------|
| Jan 1          | Straight Key Night (Dec 92)        |
| Jan 2/3        | ARRL RTTY Roundup (Dec 92)         |
| Jan 16/17      | WIA VHF/UHF Field Day Contest      |
| Jan 16/17      | HA CW DX Contest                   |
| Jan 29/31      | CQ Worldwide 160 Metre CW Contest  |
| Jan 30/31      | UBA SSB DX Contest                 |
| Jan 30 — Feb 7 | ARRL Novice Roundup                |
| Feb 13/14      | PACC CW/SSB DX Contest             |
| Feb 13/14      | RSGB 160 Metre CW Contest          |
| Feb 13/14      | Spanish RTTY Contest               |
| Feb 20/21      | ARRL DX CW Contest                 |
| Feb 26/28      | CQ Worldwide 160 Metre SSB Contest |
| Feb 27/28      | RSGB 7MHz CW Contest               |
| Feb 27/28      | UBA CW DX Contest                  |
| Mar 6/7        | ARRL DX SSB Contest                |
| Mar 13/14      | BERU CW Contest                    |
| Mar 20/21      | WIA John Moyle Field Day           |
| Mar 20/21      | Bermuda Contest                    |
| Mar 20/21      | BARTG RTTY Contest                 |
| Mar 27/28      | CQ WPX SSB Contest                 |
| Mar 27/28      | RSGB 160m SSB Contest              |

Once again some interesting contests coming up, including three popular European DX contests (HA, UBA and PACC), a couple of 160m contests, and the Spanish RTTY contest. If you submit a log, don't forget to include your call sign, name and address (it's amazing how many people do forget)!

If you don't want to go through the rigmarole of producing and submitting full logs, check logs are always welcomed.

Please forward material, suggestions etc. to me at the above address at least five weeks before the month of issue. Until next month, good contesting!

73s, Peter VK3APN

## HA CW DX Contest

This popular European HF contest is CW only, and is scheduled for 2200z Saturday to 2200z Sunday, 16/17 Jan.

Exchange RST plus serial number starting at 001. Hungarian stations will also send a 2 letter code indicating their county. Possible codes are: BA BE BP BN BO CS FE GY HA HE HO KO NO PE SA SO SZ TO VA VE ZA.

Score 6 points per Hungarian QSO, and 3 points per non-Hungarian QSO in other WAC continents. Final score is total QSO points times total Hungarian counties worked per band.

Send log, summary sheet, declaration etc. to arrive by 26 Feb at: Hungarian Radi-

oamateur Society, Box 86, Budapest H-1581, Hungary.

## UBA SSB/CW HF Contest

This is sponsored by the Belgium Amateur Radio Union (UBA), and runs from 1300z Saturday to 1300z Sunday, SSB on 30/31 Jan and CW on 27/28 Feb. Any station may work any other worldwide.

Categories include single operator single band, single operator all band, multioperator single transmitter, and QRP 10W max.

Frequencies: CW 3500-3560, 7000-7035, 14000-14060, 21000-21060, 28000-28060; SSB 3600-3650, 3700-3800, 7040-7100, 14125-14300, 21200-21400, 28500-28800.

Exchange RS(T) plus serial number. Belgian stations will add their province abbreviation.

Score 10 points for contacts with Belgian stations, 3 points with other European stations, and 1 point with others. The multiplier is the total of Belgian provinces, Belgian prefixes, and European countries. Total score is QSO points times multiplier.

Send log, summary sheet, declaration etc. within 30 days to: UBA HF Contest, Oude Gendarmeriestraat 62, B-3100 Heist Op Den Berg, Belgium.

## CQ Worldwide 160 Metre Contest

This contest runs from 2200z Friday to 1600z Sunday, CW on Jan. 29-31, and

phone on Feb. 26-28 (note different date to that shown in last month's Calendar). The object is to contact as many stations worldwide on 160m as possible. VK to VK contacts are permitted for contest credit.

Categories are single and multioperator. The use of packet, a spotting net, or logging assistant makes you multi-op. Use of a computer does not.

Exchange RS(T) plus prefix or country abbreviation (W/VE will send RST plus state/province).

Score 2 points for contacts with stations in own country, 5 points with stations in other countries in the same continent (continental boundary as for WAC), and 10 points with stations in other WAC continents. Points for contacts with/MM stations depend on their location. Countries as per ARRL DXCC list.

Multipliers include U.S. states (max 48, KH6 & KL7 are not included); Canadian provinces (max 13, including VO1, VO2, NB, NS, PE1, VE2, VE3, VE4, VE5, VE6, VE7, NWT, Yukon); DX countries, including KH6 and KL7; maritime mobiles. W/VE contacts can be claimed for state/province multipliers, but NOT for country multipliers.

Indicate the multiplier in the log only the first time it is worked. The final score is the total QSO points times total multiplier (U.S. states + VE provinces + DX countries + maritime mobiles). The preferred format for hardcopy logs is 40 contacts per page, with contacts and multipliers sub-totaled on each page.

Check sheets are required for logs containing 200 QSOs or more. Include a summary sheet showing call/name/address, category, score, station details, a signed declaration that all rules were observed, and any anecdotes/observations. Indicate CW or SSB on the envelope and mail to: "CQ 160 Metre Contest", 76 North Broadway, Hicksville, NY 11801. Mailing deadlines are 28 Feb for CW, and 31 March for SSB.

Certificates will be awarded to the top scoring stations in each DXCC country, and where scores are close, to runners-up.

## ARRL Novice Roundup

The object is for novice and technician operators in the U.S. and possessions to work as many other stations as possible, on authorised modes and frequencies, between 0000z 30 Jan and 2400z 7 Feb. Exchange RS(T) plus country (W/VE will send RS(T) plus state/province). As VK novices count as "other" and are on the same footing as full calls (according to the '92 rules), this contest is of limited interest outside W/VE. Brief details are included here, however, to encourage VK participation and possibly give some US novices their first VK contacts.

## PACC (Holland) CW/SSB DX Contest

The PACC is another popular European contest, with both phone and CW held on the same weekend, and is scheduled for 1200z Saturday to 1200z Sunday, 13/14 Feb. The object is to work as many Dutch stations as possible.

All bands 160 to 10m may be used, excluding the "WARC" bands. CW only on 160m. Stations may be worked only once per band, regardless of mode. Categories are single and multiplieroperator.

Exchange RST plus serial number starting at 001. Dutch stations will also send a 2 letter code indicating their province. Possible codes are: DR FR GD GR LB NB NH OV UT FL ZH ZL.

Score 1 point per Dutch QSO. Final score is total QSO points times total Dutch provinces worked on each band (max 72).

Mail logs by 31 Mar to: PACC Contest, PO Box 499, 4600 AL Bergen op Zoom, The Netherlands. Certificates will be awarded to the top scoring stations in each category, in each country and call area of VK, ZL etc.

## RSGB 160 Metre Contest

This contest is scheduled for 2100z Saturday to 0100z Sunday, CW 13/14 Feb, and SSB 27/28 March. The object is to work as many British Isles stations as possible (GI is considered part of the British Isles, but not EI).

Categories are (a) British Isles and (b) Overseas including EI, single operator only. Frequencies are 1820-1870 Khz, CW only.

Exchange RS(T) plus serial number starting at 001. British Isles stations will include their country code. Score 3 points per QSO, plus a bonus of 5 points for the first QSO with each country.

Send log, summary sheet, declaration etc. by 1 March to: RSGB HF Contests Committee, c/o S. Knowles G3UFY, 77 Bensham Manor Road, Thornton Heath, Surrey CR7 7AF, England. Certificates will be awarded to the leading three entrants in the overseas category.

## Spanish RTTY Contest

This contest is scheduled for 1600z Saturday to 1600z Sunday, Feb 13/14. The object is to contact as many stations worldwide as possible, on RTTY, 80 to 10m.

Categories include single operator single band, single operator multiband, multiplieroperator single transmitter, and SWL. Exchange signal report and CQ zone. Spanish stations will send signal report and province.

On 10-20m score 1 point per QSO with stations inside your WAC continent, and 2 points with stations outside your WAC con-

continent. On 40 and 80m, the QSO points are tripled. QSOs between stations in the same country can be claimed for multiplier credit, but not QSO points.

The multiplier is the sum of the DXCC countries and Spanish provinces (max 52) per band. The final score is the total QSO points times the multiplier.

Send log, summary, declaration etc. by 9 April to: EA RTTY Contest, c/o EA1MV Antonio Alcolado, PO Box 240, 09400 Aranda de Duero (Burgos), Spain.

## Results of 16th Annual VK6 3.5MHz CW/SSB Contest

CW Section:

VK6AF 1800

VK6AFW 1350

VK6BWI 770

SSB Section:

VK6XG 15456

VK6WJH 10868

VK6AFW 10290

VK6RG 8626

VK6DE 8424

VK6AMB 6916

VK6MO 6494

VK6BWI 5250

VK6DA 2948

VK5AYD 2184

VK5NYD 2184

VK6NRE 1800

VK5PMC 972

Conditions for both sections were very good, with some good CW contacts with all of VK, and some DX contacts to ZL.

More participation by VK6 stations would have been appreciated by all, especially in the CW section, so how about it next time! It's a friendly contest of only 3 hours duration.

73s, C. Waterman VK6NK

## Regional Results of 1992 ARRL DX Contest

(Shown in order: call, score, QSOs, multiplier, band. M = multiband)

CW Single Operator:

VK2APK 1,033,968 1657 208 M

VK2AYD 226,800 525 144 M

VK6HG 29,394 142 69 M

VK2DID 11,844 84 47 M

VK2AYK 1,632 32 17 40

VK4TT 20,640 160 43 20

VK4XA 133,002 821 54 10

VK8BE 2,280 40 19 10

VK9XM (Lord Howe Isl, W5BOS opr)

6,570 73 30 10

ZL3GQ 130,845 793 55 40

P29DK 40,545 159 85 M

Phone Single Operator:

VK2AYK 495,582 1094 151 M

VK5GN 275,940 630 146 M

VK1PS 102,900 343 100 M

VK3DZM 13,716 127 36 80

VK2GAH 239,772 1378 58 10

|        |           |      |     |    |
|--------|-----------|------|-----|----|
| VK2ARJ | 219,240   | 1260 | 58  | 10 |
| VK8TM  | 131,040   | 780  | 56  | 10 |
| ZL4NF  | 193,914   | 567  | 114 | M  |
| ZL2AH  | 152,028   | 492  | 103 | M  |
| ZL2LOW | 126,498   | 727  | 58  | M  |
| ZL1IM  | 20,043    | 131  | 51  | M  |
| ZL2AFY | 3,813     | 41   | 31  | M  |
| P29DX  | 2,003,100 | 3035 | 220 | M  |

Continental leaders for Oceania include:

VK2GAH (10m phone)

VK3DZM (80m phone)

ZL3GQ (40m CW)

The top 10 single band scores include:

VK3DZM 9th outright 80m phone

ZL3GQ 6th outright 40m CW

(from QST Oct 92)

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## FTAC Notes

John Martin

VK3ZJC FTAC Chairman

## Call Book Update

Here are some corrections which just missed out on the deadline for inclusion in the 1992-1993 Call Book.

The Elizabeth Amateur Radio Club has advised that its repeaters are all operational. The Packet systems are on 144.800 and 439.050 MHz. The club also operates a beacon on 1296.550 MHz and has one planned for 2304.550 MHz.

The Yorke Peninsula Repeater Group is testing VK5RLH (146.925) on Bumbunga Hill. It serves the mid North and all around Spencer Gulf. Other data is T, 80, 430, 5.0, SYP.

VK3REG (146.650) is to move to Mt Cann (530m) by early 1993. VK3REB (146.900) is now on Mt Nowa Nowa (354m). VK3RGO (147.050) has an ERP of 20W.

The list should have included VK3RHO (146.850) Mt Buller, Eastern Victoria, O, 30, 1862, 2.5, VWE.

In the beacon list, all entries for VK3RMV should be deleted, and VK5RLZ added on 1296.550 (o) and 2304.550 (P).

The 50 MHz band plan in the Call Book contained an oversight on my part. The footnote relating to time-shared beacons on 50 MHz should have been deleted, as the time-sharing has been dropped.

ar

**Remember to leave  
a three second  
break between overs  
when using a  
repeater.**

# Commonwealth Contest 1992

## — Results

Compiled by John Tutton VK3ZC

Although in excess of 60 different VKs were heard exchanging serials in this year's contest, only 32 of them submitted logs as part of the grand total of 132, the largest for some years.

Conditions were quite good, and locally, the average scores were well up on recent years. Many would have been very pleased to work ZD8LI and VP8GAV whose signals came through very well on the Sunday afternoon, and had great pile-ups on them from this area.

The old VE6OU seems to have settled down in Ontario and with his new call VE3EJ, really spreadeagled the opposition with what must surely be an all time record score.

Three VKs made the top ten, with VK2BJ's 6255 bettering the previous Australian record of 6190 set by VK6LW in 1990.

| Top Ten       | 80  | 40   | 20   | 15   | 10   | Total |
|---------------|-----|------|------|------|------|-------|
| 1. VE3EJ      | 685 | 1885 | 2340 | 2195 | 1310 | 8415  |
| 2. VE7CC      | 400 | 1385 | 2085 | 1990 | 1615 | 7485  |
| 3. ZL3GQ      | 770 | 1115 | 2035 | 2105 | 980  | 7005  |
| 4. ZD8LI      | 150 | 1265 | 1760 | 1880 | 1695 | 6730  |
| 5. VK2BJ      | 685 | 1180 | 2105 | 1365 | 920  | 6255  |
| 6. VK2APK     | 740 | 960  | 1960 | 955  | 845  | 5460  |
| 7. ZC4CZ      | 270 | 965  | 1475 | 1235 | 1165 | 5110  |
| 8. G3MXJ      | 275 | 915  | 1450 | 1250 | 1170 | 5060  |
| 9. CS6/GH3YOR | 515 | 1375 | 1320 | 1405 | 4615 |       |
| 10. VK4XA     | 395 | 695  | 1680 | 1185 | 660  | 4535  |

### Australian Scores

|           | 80  | 40   | 20   | 15   | 10   | Total |
|-----------|-----|------|------|------|------|-------|
| 5 VK2BJ   | 685 | 1180 | 2105 | 1365 | 920  | 6255  |
| 6 VK2APK  | 740 | 960  | 1960 | 955  | 845  | 5460  |
| 10 VK4XA  | 395 | 695  | 1680 | 1185 | 660  | 4535  |
| 21 VK5BN  | 475 | 510  | 1380 | 865  | 405  | 3635  |
| 25 VK5GZ  | 350 | 675  | 1520 | 765  | 155  | 3465  |
| 29 VK3ZC  | 440 | 910  | 940  | 775  | 200  | 3265  |
| 40 VK8HA  | 75  | 325  | 990  | 580  | 745  | 2715  |
| 41 VK6RU  | 325 | 990  | 825  | 605  | 2685 |       |
| 52 VK3DQ  | 415 | 435  | 985  | 250  | 225  | 2310  |
| 55 VK2EL  | 500 | 1090 | 655  | 50   | 2295 |       |
| 55 VK4OD  | 325 | 360  | 835  | 775  | 2295 |       |
| 56 VK2DID | 255 | 625  | 575  | 640  | 150  | 2245  |
| 57 VK6BB  | 75  | 345  | 800  | 620  | 375  | 2215  |
| 63 VK4XW  | 315 | 560  | 605  | 535  | 50   | 2065  |
| 66 VK2AYD | 295 | 600  | 720  | 380  | 25   | 2020  |
| 76 VK2AQF | 280 | 510  | 665  | 305  | 1760 |       |
| 77 VK3XB  | 255 | 325  | 665  | 505  | 1750 |       |
| 82 VK3BXA | 80  | 485  | 785  | 125  | 100  | 1575  |
| 87 VK6RZ  | 460 | 425  | 435  | 150  | 1470 |       |
| 92 VK7RY  | 260 | 450  | 300  | 200  | 150  | 1360  |
| 95 VK6HG  | 100 | 450  | 445  | 205  | 1200 |       |

|           |     |     |     |     |     |     |
|-----------|-----|-----|-----|-----|-----|-----|
| 98 VK2AIC |     |     | 450 | 355 | 305 | 995 |
| 101 VK3XF | 200 | 400 | 275 |     |     | 875 |
| 111 VK7GB |     | 190 | 15  | 100 | 75  | 380 |

### Single Band Entries

|           |      |
|-----------|------|
| 3.5 MHz   |      |
| 1. VK2ETM | 410  |
| 7 MHz     |      |
| 1. VK7RO  | 1080 |
| 2. VK3APN | 890  |
| 3. VK6LW  | 690  |
| 14 MHz    |      |
| 1. VK6AJ  | 2005 |
| 2. VK4TT  | 1985 |
| 3. VK3MR  | 1090 |
| 21 MHz    |      |
| 4. VK5AGX | 910  |

### Other Pacific Area Scores

|            |      |
|------------|------|
| 3. ZL3GQ   | 7005 |
| 11. ZL1AIZ | 4430 |
| 17. ZL1MH  | 4020 |
| 65. ZL1HV  | 2055 |
| 72. ZL2BCH | 1820 |
| 81. ZL2BRT | 1580 |

The following Commonwealth Call Areas were active during the event; A2, C5, G, GB5CC, J8, P2, P29HQ, V4, V8, VE1-2-3-4-5-6-7, VK1-2-3-4-5-6-7-8, VO1, VP2M, VP5, VP8, VP9, VS6, VU, Z2, ZB, ZC, ZD8, ZL1-2-3-4, 3B8, 4S7, 5B, SZ, 6Y, 7Q, 8P, 9J.

No doubt many VKs would have been pleased to pick up a few of this lot.

### RSGB Comments

"Canada was the place to be for top honours this year and congratulations to John Sluymen VE3EJ (formerly VE6OU/3), for his record breaking score of 8415 points, beating runner-up Lee Sawkins VE7CC by nearly a thousand points. RSGB HF Committee Chairman Bob Whelan G3PJT, at the start of a business trip to British Columbia, used VE7SV's station to lead the single band entries. Single band entries are not to everyone's taste but they do allow operators to grab a reasonable amount of sleep while staying competitive, and the single band entries have been tabulated separately this year to make for easier comparison.

In the UK, Dennis Andrews G3MXJ, takes the Colonel Thomas Rose Bowl, followed by Jan Fisher G0IVZ, in his first attempt in BERU. Special mention must be made of Frank Cooper, G2QT: this year is his fiftieth entry in BERU, an incredible achievement. Licensed in 1933, he first entered in 1935 and has only missed one year — 1968 — when he was abroad. Even then he made arrangements to operate from VP6 (now 8P6) but circumstances meant that the station which he was supposed to use was unavailable. Now aged 78 and retired less than two years, he spends a great deal of time on antenna experiments and has notebooks containing all the results of his antenna work going back to 1933. In addition to a homebrew three element quad on a commercial lattice tower for HF, he has five wooden masts between 50 and 60 ft in height which he raises and lowers single handed with the aid of a winch for maintenance purposes. (The creosote does its job well as half of one mast is pre-war). Currently the masts support a five-element and two three-element wire yagis for 40m, and a W8JK for 80m. He modestly describes himself as "a consistent also ran" but it is the enthusiasm and dedication of stalwarts like G2QT which make BERU such a special event.

Entrants again suffered QRM from the Japanese 59-Magazine CW contest, but thanks to the considerable efforts of David Rankin 9V1RH, and Masayoshi Fujoka, JMIUXU, the Chairman and Secretary respectively of IARU Region 3, the Japanese have restructured their event into separate 48-hour LF and HF contests to be held on 8-10 January from 2200h and 9-11 April from 2300h (1993 dates), thereby avoiding a clash with BERU. The best way of ensuring that we do not get jumped on by another contest is to keep the activity level high, and this year's record score indicates that the trend is in the right direction. See you all on the second weekend in March 1993, and bring a friend!" G3AEZ

### 1993 Commonwealth Contest

The Commonwealth Contest for 1993 will be held from 1200Z 13th March 1993, to 1200Z 14th March 1993. The rules will be published in the February 1993 issue of "Amateur Radio" magazine.

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**Sign up a new WIA Member today — use the form on the reverse side of the AR Address Flysheet.**

# Divisional Notes

## VK2 Notes

Tim Mills VK2ZTM

A Happy New Year to all and hopefully better than the last. The change of years is an important time for the Division. The financial year starts for the Division on Jan 1st. Before we know it there is another AGM which will be on Sunday May the 2nd. The close for agenda items and Council nominations is Wednesday March the 17th. Annual reports have to be in the hands of the Secretary by January 31st.

The Parramatta office will close 18th December and reopen January 11th. First Wednesday night opening January 13th. The VK2W1 broadcasts for December 27th and January 3rd will be morning only. Both sessions resume January 10th. Mail and FAX handled as usual during the holiday break. The first Trash and Treasure for 1993 will be Sunday afternoon the 24th January, earlier in case the last weekend becomes a long weekend.

The Divisional component of the subscription for 1993 remains unaltered.

## 1993 Exams

The exams conducted by the Division at Parramatta will be Sunday February 21st, May 23rd, August 29th and November 7th. Note the change in February to that previously advised. The Gosford Field Day has moved to a later date as well as a change of venue (Wyong Racecourse — Sunday February 28th.) Since almost everyone attends the Central Coast Field Day you may have been lonely at the exam.

## Forums

During November there were three meetings which addressed aspects of the hobby in VK2. The first on the 21st saw 25 with an interest in ATV meet to discuss channel sharing in the Sydney region. On the 22nd over 40 packet users met throughout the day to cover the wide ranging agenda. Details have already been distributed via the packet networks A "NSW packet radio committee" was established by the forum attendees. It's an advisory committee with the charter "to improve, oversee and co-ordinate packet radio in New South Wales", though it has no regulatory powers. The committee is to meet again in February.

The third meeting on the 25th was for the Divisional Volunteers on the planning underway to improve the Division's operation. The functions and services of the Division had been raised at the open forum in August. The investigation following the forum identified five distinct sections, being, Administration, Member Services, Education, Advertising and Publicity and finally Tech-

nical Services. These sections are made up of more than 50 functions and services currently provided by the Division. An expanded report is to appear elsewhere and via the broadcasts.

## Repeater Applications

During November the following applications were processed and forwarded to the DoTC. For WICEN (NSW) Inc portable repeaters for operation anywhere in VK2 on 2 metres, VK2RF1 on CH 7150 and VK2REP on ch 7175. A 70 cm packet link channel on VK2RW1. A 10 metre voice repeater for the Wagga Wagga DX Group on 29.640 Tx — 29.540 MHz Rx, requested callsign VK2RHF. A packet repeater on 2 m for the Far South Coast ARC on ch 4875 & 70 cm linking. Goulburn ARS to add an additional 2 metre packet channel 7575 to VK2RGN. Summerland ARC to add a 6 metre repeater to VK2RIC on ch 3550 and plan to establish a 2 metre voice repeater — VK2RPG — near Pretty Gully.

Applications were being processed for Tamworth RC for a 70 cm packet link, and a packet channel 4800 and 70 cm links for the University of Technology Sydney ARS at Broadway.

A reminder to repeater groups that the guidelines for repeater establishment, operation and maintenance is detailed on page 27 of the new callbook. Contact the VK2 office for the required paperwork to establish or alter a system. This speeds up the processing. The DoTC will hold or send on paperwork to the Divisional Repeater Coordinator if you send it direct to them.

Please check the new callbook for your current repeater listings. Advise without delay any corrections for next months DATA issue of "AR".

## Join or Renew and Win a Rig!

The NSW Division is running a special membership and recruitment promotion:

## New Members

Our usual warm welcome is extended to the following who joined the Division during last November.

|                 |            |        |                |
|-----------------|------------|--------|----------------|
| W.K. (Wendy)    | Anderson   | VK2WAD | Castle Hill    |
| P.C. (Percival) | Bullman    | VK2TEN | Miller         |
| R. (Richard)    | Close      | VK2BRB | Wallsend       |
| J.C. (John)     | Cowell     | VK2MML | Mt. Pritchard  |
| J. (John)       | Dudley     | VK2MMF | Hazelbrook     |
| P.J. (Peter)    | Ferrari    | VK2BXQ | Tullamore      |
| S.A. (Stephen)  | Knowles    | VK2GVR | Milperra       |
| G. (George)     | Pal        | VK2PGA | Wollstonecraft |
| C. (Claude)     | Pradier    | VK2CXC | Albury         |
| R. (Ronald)     | Spain      | Assoc  | Toongabbie     |
| R.A. (Robert)   | Stephenson | VK2KKK | North Sydney   |
| P.D. (Paul)     | Thomas     | VK2WPT | Tottenham      |
| S.A. (Scott)    | Watson     | VK2TAR | Bligh Park     |
| A.H. (Mick)     | Wood       | VK2VX  | Frenchs Forest |
| L. (Luigi)      | Zilli      | VK2TLL | Bossley Park   |

members who renew, or non-members who join up, between 1 December 1992 and 28 February 1993 will be eligible to win a new rig from Kenwood.

But wait! There will be not one, but TWO, rigs to win.

First prize will be a TM-732A dual-band 2m/70cm mobile rig, while second prize will be one of the just-launched TM-28 2m handheld rigs. Both prizes will be awarded by way of a draw.

And for new members who join up in the period there's a bonus: Kenwood is donating an amateur radio world map "place mat" to the first 100 new members to sign up.

Kenwood Electronics Australia has generously agreed to sponsor the promotion by donating the prizes. If you haven't heard the full details on the VK2W1 Sunday news broadcasts yet, then listen out as soon as you can.

## VK6 Notes

Harry Atkinson VK6WZ.

The year 1993 has begun and with the festivities behind us it could be a good time to think about the future.

There can be no doubt that '93 will end with our hobby looking a lot different compared with the situation at the end of '92. De-regulation is sure to become more widespread; the old rules many of us were brought up on will have disappeared; there will be a greater responsibility on each and every licensee to "keep his nose clean" without the fear of someone watching every move from "on high".

Regrettably, there will be some who confuse freedom with open slather but the vast majority of amateur operators will continue to take pride both in our hobby and in their reputations as good citizens.

The President VK6LZ and councillors of the Division wish you a happy and successful New Year.

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# How's DX

Stephen Pall VK2PS PO Box 93 Dural NSW 2158

Happy New Year to you all. The material for this column was written on 24th of November, because of our peculiar Christmas Holiday "shut down" to reach you (hopefully) in the first week of January. The November issue of this magazine, with the news of the proposed shortening of the length of "How's DX?" column, was delivered to the readers between the 11th and the 17th of November, judging by comments read in letters since received, and heard over the air. The last ten days produced a number of letters, faxes and ten telephone calls. This number in my opinion is not adequate to give a true picture of the opinions of readers of this column. So if you care, voice your opinion immediately. The decision has to be made soon!

## Lord Howe Island VK9L

Lord Howe, a sub-tropical island lying in the South Pacific is approximately 700 kms north-east of Sydney or 700 kms south-east of Brisbane, an airlight time of approximately two hours. The island was discovered in 1788 by Lt Henry Lidgbird Ball and is part of NSW with a local Administration Board which looks after essential services on the island. The local population (under 300 people) has two sources of income; the well known Kentia palm which is exported to all the corners of the globe, and tourists, whose numbers are limited to a maximum of 400 at any one time. This limitation in numbers requires quite some advance planning from intending tourists and radio amateurs looking for an ideal DX-spot. This was the scene that Bill VK4CRR and Len VK4DDK found when they operated from Lord Howe from the 18th to the 25th of November. They had difficulty finding a place to stay as all accommodation was booked out until February 93, and most accommodation places do not want radio amateurs. I wonder why? Bill and Len operated under the callign VK9L.D and QSLing will be done by Bill VK4CRR, direct only, with SAE and return postage. No bureau cards will be accepted. Bill's address is; W Horner, 26 Iron Street, Gympie, Queensland 4570.

## Cocos Island TI9

Cocos Island or Isla del Coco to give its proper Spanish name, is a rocky outcrop and lies 5 degrees 32 minutes North and 87 degrees 04 minutes West in the Pacific Ocean, and is part of Costa Rica.

Jose, TI2JJP and a group of helpers kept

Cocos Island, TI9JJP on the air from the 1st to the 11th of November on all bands, mostly SSB with some RTTY and CW mixture. They were good copy in Sydney around 0417 UTC on the usual 14195 SSB DX band segment. QSLing direct only, to TI2AOC Cecilia Artinano de Pastora, Box 529, Centro Colon 1007, San Jose, Costa Rica. US\$1 preferred for return postage.

## Jordan JY40

His Majesty, Alhussein Ibn Talal, better known as King Hussein of Jordan, also known under his amateur callign as JY1, celebrated his birthday on the 14th of November. The day marked also the 40th anniversary of his ascension to the throne of Jordan. To celebrate this double anniversary the Jordanian amateurs used the special prefix of JY40 followed by their individual suffix a number of days ending on the 20th of November. Zedan's net, JY3ZH on 14250 at 0500 was very busy with traffic from all over the world. At least a dozen JY40's were heard on the East coast of Australia. Those who want to obtain a commemorative diploma (minimum five contacts with JY40 stations) signed by the King himself, should send their QSL cards, application form and ten IRCs to the Royal Jordanian Radio Amateur Society, Box 2353, Amman, Jordan.

## Saint Helena ZD7

Saint Helena, a small mountainous volcanic island in the Atlantic Ocean (15 degrees 57 minutes S, 5 degrees 42 minutes W) has a surface of 122 square kilometres with a population of about 5000 people. It is a British Island and the administration centre of other British Islands (ZD8 and ZD9) in the southern part of the Atlantic. Its only significant fame is that Napoleon Bonaparte lived here in exile for six years until his death in 1815. There is not much activity from the island, so it is always a challenge to work a ZD7 from VK when it pops up on the bands. Bill, VK4UA was instrumental of persuading Chuck, ZD7CRC to keep a lookout for the VKs and ZLs on 14153 SSB at around 0730 UTC in the early part of November. Chuck was a reasonable copy on the eastern part of VK for many days for the benefit of the Australians and New Zealanders. QSL to Chuck Chalmers, PO Box 126, St Helena Island, South Atlantic Ocean.

## Pacific activity by Europeans

Quite a number of Europeans were island hopping in November and December and are still in the Pacific area this month. Mike, G4IUF was active from New Zealand (N6SVL/ZL), from Cook Islands (ZK1LF), American Samoa (KH8/N6SVL), Fiji (3D2UF), and Western Samoa, 5W1VL. Three former East German amateurs, Tom, Y31XO, Frank, Y32QD, Holger Y58IQ, and (YL) Birgit Y58AO will tour Fiji (3D2), Solomon Islands (H44), New Caledonia (FK8), and Wallis Island (FW). They are using a homemade amplifier with a "no transformer" direct voltage doubling power supply. They might visit Tuvalu (T2), and/or Nauru (C2) before they return home at the end of January.

Karl, DL1VU was also on the move. His operating schedule looks something like this; T32VU (Christmas Is), KH5/DL1VU (Palmyra), T31AF (Canton Is), T30CT (Tarawa), T33VU (Banaba), C21NI (Nauru), V63VU (Kosrae), KC6/DL1VU, (Ponape), DU1/DL1VU (Manila). Most of his operation is in CW including WARC bands on the usual DX frequencies. Everyone contacted will receive a QSL card via the Bureau.

## Hungarian DX Expedition to T31 and T33

Eli, HA9RE plans to go to Phoenix Island, Central Kiribati (T31), and Banaba (Ocean) Island T33 in January, February this year. This is his third trip to the Pacific. In December 1990 February 1991 he activated, in company of Miki (HA8XX), Chatham (ZL7), Niue (ZK2) and Cook Islands (ZK1). January to March 1992 saw activity from West Kiribati (T30) and from East Kiribati (T32). In the course of these two expeditions almost 100,000 contacts were made.

## Future DX Activity

- Ken, WA4OBB is planning a second trip to Chad (T78) in February or March.
- The proposed DXpedition to Palmyra Island (KH5) and Kingman Reef has been postponed until February.
- It has been reported that ZS7ANT is active in the Antarctic until mid-February.
- Bernhard, DF3ZJ, will be active as 9X5AB until August 1994. QSL via DL6NA or direct to Bernhard Ahlborn, BP 420, Kigali, Rwanda, Africa.
- There is a new operator at Crozet Island. FD1NOG will be active as FT4WD, but he is not an experienced DX operator. QSL to F6AXX.
- Jan Mayen Island should be heard during the northern winter with JX7DFA and JX3EX being active. QSL to LA5NM.

- HF0POL from the South Shetland Islands is very active mainly in CW on 3.5, 7, 14 and 28 MHz.
- It was announced on the air, that ZL2AHC is planning to go to Chatham Island (ZL7) in March 1993.

## Interesting QSOs and QSL Information

Note: call sign, name, frequency, mode, UTC, month.

FY5FP, 14016, CW, 0940, Oct, QSL via Bureau.

TJ1GG, 14015, CW, 0630, Nov, QSL to I2EOW Ermanno Pandocchi, Via Moretto da Brescia 40, I-20133, Milano, Italy.

OD5/SP3LSE, Zenek, 14006, CW, 0653, Nov, QSL to SP7EJS Antoni Lichota, Box 82, 96-100, Skierniewice, Poland.

FG4FR, Franz, 14010, CW, 0511, Oct, QSL to FG5BG Georges Santalikian, 44 Rue Amedee Fengarol, Brest, F-97130 Capesterre Belle Eau, France.

7X2VFK, Mohammed, 14243, SSB, 0658, Nov, QSL to PO Box 467, Djelfa, 17000, Algeria, Africa.

ZP5CCGL, Laca, 14192, SSB, 0958, Nov, QSL to Bureau.

FY5FJ, Richard, 21205, SSB, 0441, Nov, QSL to IK2HTW Angelo Morello, PO Box 41, I-21021, Angera, Italy.

OD5PL, 14252, SSB, 0703, Nov, QSL to HB9CKV Hermann Stein, Bruehlmaten 13, CH-4410, Liestal, Switzerland.

YIIBGD, 14252, SSB, 0610, Nov, QSL to YJ3ZH Zedan Hussein, Box 11020, Amman, Jordan.

ZL7AMO, Ron, 21205, SSB, 0521, Nov, QSL to ZL1AMO, Ron W. Wright, 28 Chorley Ave., Massey, Henderson, Auckland, 1208, NZ.

WIGW/KC4, Warren, 14159, SSB, 0955, Nov, QSL via the W1 QSL Bureau to home call.

## From here and there and everywhere

- OD5ZZ was heard saying that there will be many new amateurs on the air soon, from Lebanon.
- Les, VK4DA advises that a letter sent to 524FM to a Nairobi PO Box number was returned after 10 months, marked "insufficient address". However, the "greenstamp" was missing from the returned envelope.
- 7X2VFK was a special event station in Algeria commemorating the start of the Algerian revolution in 1954. The station was active from the 1st November to the 10th of November on 10 to 160 metres.
- There are still quite a number of amateurs who are waiting on cards from

Romeo's Afghanistan, Myanmar, Spratly and other operations. Rumours abound about the incorrect QSL routes, alleged non-QSL managers, missing mail, missing contents of envelopes etc. Romeo has now sent a lengthy FAX to the "DX News Sheet" explaining some QSL routes. Here is a shortened version which applies mainly to VK/ZL stations. IS0XV, IS1RR (1990), 3W7A, 3W100HCM, XV100HCM, XV0SU cards go via W4FRU or Romeo's Bulgarian address. YA0RR (Dec 91), IS0RR (Sept 91), XY0RR to the Bulgarian address; 9D0RR (Aug 92) via NT2X and all others, like EK0RR, MM, 3W3RR again to the Bulgarian address. Romeo has all the original logs. The American and Canadian operations of Romeo go via the W1 QSL Bureau. Romeo's Bulgarian address is PO Box 812, Sofia 1000, Bulgaria. Romeo says that the Sofia address is now absolutely secure. However in the distant past, a lot of envelopes (approx 2500) were "lost", and cannot be recovered. Romeo further says that he is not a member of the ex-USSR QSL Bureau (Box 88, Moscow) therefore the QSL route is direct only to the Bulgarian address. A "lot" of cards sent to various ex-USSR addresses were "lost" by postal workers.

- If you hear the beacon of the "Earthwind" balloon on 28303 kHz, send your SWL report to Richard, N81WJ.
- NP2CG, Lee, was active from St Thomas, US Virgin Islands. QSL to WA2NHA.
- According to the 1992 most wanted DXCC Countries survey, conducted by "The DX Magazine" Peter I Island (3Y) is required by 67.8% of the DX-ers surveyed, and is ranking No 1 in the list. Bhutan A5 is required by 60.2% (No 2), Libya (5A) is required by 59.5% (No 3). How things have changed! Albania (ZA) is the last in the 100 most wanted countries list, required by only 6.9% of the DX-ers.
- JU830C is the special event station activated by the MRSF (Mongolian Radio Sport Federation), celebrating the 830th anniversary of the birth of the ancient Mongolian Leader, Chingis Khan. QSL to JT1KAA.
- The validity and/or expiry date, or whether the IRC which bears the wording "surface mail" is valid for Air Mail, has been explained by Sandy, N7PQP, who is a US postal employee. Sandy says in "The DX Magazine" that every IRC issued after 1975 is valid and will be accepted for Air Mail postage in countries which are members of the Universal Postal Union.

- If you worked TL8NG, he is Gene, from the Central African Republic. He is active mostly on CW but he has been heard also on various nets on the 20 metres band. QSL via WA1ECA.
- It was quoted by G3KLL as heard from UC2AB as saying, that the UC2 (Byelorus) outgoing QSL Bureau has closed down due to lack of funds.
- Ron, ZL1AMO was quite active as ZL7AMO mainly on CW, but showed up quite often on various SSB nets. QSL direct with return postage to home call.
- A number of Spanish amateurs received a one year special authorisation to operate on 6 metres with the EH prefix.
- If you heard VK8QQ operating portable from Bathurst Island, he was DFSUG.

The second "International Border Meeting" of radio amateurs took place on the 19/20th September in the Hungarian City of Sopron, near the Austrian, Slovak border. 550 amateurs attended from 9 countries. A number of topics were discussed dealing with VHF-UHF Satellite EME communications before many representatives of Europe and US visitors.

- One does not hear much of Mirek, VK2DXI. A quiet DX'er who since he left his native Poland in 1981, operated from many locations. Just to name a few: OE(81), DL(86), VK9N(87), 9V1(87), 8Q7(88), BY1PK(88), SM5(90), VE(90-91), W(KH6, 90-91), VP5(90), SO5(91), 9M2(91), 9M8(91), 9N1(92), VU2(92). Mirek operates mainly CW and is an avid contester. (See December "AR"). Starting with the 9N1 activity, he asks that all cards are to be sent to his new QSL manager, DL4DBR Ted Barczyk, Pappelstr. 34, W-5800, Hagen 1, Germany.

## QSLs Received

Note: There was quite an interesting selection to report on. However, this article is already too long, so I decided not to publish the list this month. For the same reason, there is no DX related photograph in this month's column. If you miss them, then please write me a few lines.

## Thank you

Many thanks to: VK2CSZ, VK2DID, VK2DXI, VK2KFU, VK4CRR, VK4DA, VK4DDK, VK4OH, JY3ZH, HA5BSW, HA5HR, HA9RE, and the following publications: QRZ DX, The DX Bulletin and the DX News Sheet.

Good DX and 73

ar

## Murphy's Corner

November Issue 1992  
Article — Morse Trainer for GW Basic,  
Page 12

- A few errors crept in the typing:
- Line 60 contains 8 characters too many in the underlining.
  - Line 110, the word 'Enter' should be between single quotes, not double.
  - Line 320, the x symbol should be a ( (less than symbol). This line should read; 320 IF K ( KK THEN 250

*Production Editor's Note — We tested the program on the WIA IBM compatible computers and it works very well. If any member would like a copy on disk (to save typing), we can provide same on receipt of a formatted floppy disk (IBM format, 9cm or 13cm) and a SASE, alternatively send \$5-00 to cover postage and the disk to me at the WIA Federal Office, PO Box 300, Caulfield South Vic 3162. Please allow a few days for turn-a-round .... VK3UY.*

## Silent Keys

*Due to increasing space demands obituaries should be no longer than 200 words.*

The WIA regrets the passing of :

|              |            |        |
|--------------|------------|--------|
| L H (Leo)    | McMahon    | VK2AC  |
| B            | Ronald     | VK2EHR |
| H T (Hugh)   | Tolhurst   | VK2GOS |
| R L J (Rob)  | Warren     | VK3CRW |
| J D (John)   | Sweeney    | VK3IH  |
| J K (John)   | Pollard    | VK3QZ  |
| N A (Norman) | Richardson | VK4BHH |
| M J          | Stinson    | VK4DD  |
| S (Stefan)   | Demchenko  | VK6UC  |

### Bernie Gates VK6KJ

The many friends of Bernie Gates VK6KJ will be saddened to hear of his pass-

ing on Friday 6th November 1992 at the age of 76 years.

Bernie had been in indifferent health for some years, but the final illness lasted only a few weeks during which time he was confined to bed.

Bernie was active on the HF bands for over 40 years, working his scheds on 80, 40 and 20 metres almost to the time of his passing. Many VK5 and VK3 amateurs will remember him for his proving the VHF path between VK6 and the southern states in the 60s and 70s, when he worked many stations over the Bight on two metres.

Communication was Bernie's life. Even when he was confined to bed at the last, he kept in touch with his friends on the 40 metres "Shavers" Net" via a two metre link and his Barlow-Wadley receiver.

Bernie will be remembered also by the many who were given willing assistance by him over the years. He will be missed.

We extend our sympathy and best wishes to Jean, his XYL, and Jenny and Kim, his family.

**Bob Elms VK6BE**

### Norm Richardson VK4BHH

Norm was a traditional reticent English gentleman with a lifelong interest in radio and shortwave listening.

During WWII he served in the English Army intercepting coded German traffic which was deciphered at the noted Bletchley Park signal centre. Serving later in the Malayan crisis, listening through heavy atmospheric noise impaired his hearing, though he could copy 35 WPM on a typewriter.

Fortunately for Amateur Radio, Norm also gained a passion for detecting weak signals, and more importantly, locating their origin.

He was a member of RSGB for many years, and in his early 70s left England and joined his son in Mt Isa. After a couple of years there, he and his wife moved to Everton Park where Norm became involved again in monitoring. The WIAQ appreciated his skills by awarding him the WIA 75th

# SOME THINGS HAVE NO COMPARISON

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Norm was 86 when he died of a sudden stroke on 6th November 1992, leaving a large gap in the ranks of the few Intruder Watchers.

Our sincere sympathy goes to his wife Rose, and family.

Col VK4AKX  
Guy VK4ZXZ  
Tom VK4BTW

### Hugh Tolhurst VK2GOS

I regret to advise the sudden death on Monday 23rd November 1992 of Hugh Tolhurst, VK2GOS, Secretary/Treasurer of the Great Lakes Radio Club Incorporated. Hugh was 70 years.

Whilst out cycling in the early morning, he suffered a massive heart attack which took his life before medical assistance could arrive.

Hugh, who obtained his full call only last year, embraced amateur radio with all the enthusiasm which characterised his other loves of golf and photography.

The deepest sympathy of his many friends goes to his wife Rosemary, and his family. The world is poorer for his passing.

Stan Ellis VK2DDL  
President  
Great Lakes Radio Club Inc

### John Kenneth Pollard VK3QZ/VK3TCK

John Pollard became a Silent Key at home while preparing to work on his antenna. He had a heart attack on the 11th November 1992 at age 61.

I first met John in 1988 when after studying for his novice licence with VK3BSM of the Eastern Zone, he wished to further his theory to the full call. He joined a course I was running at the time. He successfully passed his full call and got the callsign

VK3QZ from Graham Colley when he moved to Queensland.

John originally came from England and migrated to Australia in 1973 worked as a Civil Engineer on several jobs before moving into the VK3 Eastern Zone in 1985 to work on the Loy Yang Power Station project. His interest in radio started in CB and then he went on to amateur radio as above.

During his time as an amateur he was a great ambassador for his adopted home, he regularly collected local literature from the Latrobe Regional Commission for inclusion with his QSL cards. He made several major trips around VK visiting people he had met on air, and in 1991 he made the local news for his contact with Kuwait during the Middle East war.

John was a great person and a credit to the amateur radio world. His quick wit and jokes will be missed on the airwaves. Sincere sympathy to Shirley and family.

Tom Corrigan VK3XBG  
ar

## Over to You — Members Opinions

All letters from members will be considered for publication, but must be less than 300 words. The WIA accepts no responsibility for opinions expressed by correspondents.

I really would be most grateful if you could pass on the thanks and appreciation of myself and my brothers.

Sincerely,  
Ann Phillips  
ar

### Thanks for AR7

I wish to put on record my sincere thanks to all those who responded to my "Wanted Vic" advertisement in the September issue of AR. The advertisement asked for help in providing a "Kingsley" AR7 receiver for the Scienceworks (Museum of Victoria) collection of Australian designs and inventions.

The response was wonderful with the result that a fully operational, up to specification AR7 complete with power pack, speaker and rack was handed over on Wednesday 25th November. A very pleasing feature of the operation was that everything used was a cost free donation.

The unit will be on display until at least the end of July 1993.

The full story will appear in a later issue of AR.

Thanks again everyone.

Allan Doble VK3AMD

### Re Gavin Douglas VK3YK (Silent Key)

At the funeral of my father, Gavin Douglas VK3YK on 9th November 1992, there were a number of radio hams present that I did not know, and as a result of confusion on my part and also of the rain, I was not able to speak to all of those present.

I wonder if you would be so kind as to

pass on my appreciation and thanks to all those people for me.

The radio played a very important part in Dad's life, and it was wonderful to know that so many of his friends were there. Over the years I know he enjoyed the friendship and interest of many people, whether they were regular contacts or occasional when conditions were favourable.

In later years, I think the contact with yachtsmen and women was a particular interest as he had sailed as a young man. He also enjoyed the travellers net, and most recently enjoyed the friendship and support of the VK3UE net.



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# A Packet of Packet

Kevin Olds VK1OK 238 Southern Cross Drive Latham ACT 2615

Although a little bit later than anticipated, we finally have the next instalment in the packet column. Already I have started to receive some feedback on the first column which is most encouraging. More would be welcome however. If all goes well we may see something in this column on almost a monthly basis, with items split between basic material for the would-be or novice packeteer and items for those more experienced in the packet world. Interspersed will be some more general interest items which may stir the interest of a few more to try packet. Packet is more than just Bulletin Board Systems, it has a breadth of interest all of its own. For this month's column I am indebted to Warren Toomey, VK1XWT for the use of his item on "Wormholes — the Last 12 Months" which he presented to the CAPRG Technical Symposium in September 1992. Now over to Warren.

## What is a Wormhole?

A wormhole is a machine connected to both the amateur radio network (via a transceiver) and another network, and uses this network to transparently pass packet radio packets. In other words, the wormhole is using the second network as a medium for packet transmission. With several wormholes connected by a network, amateur packets can be forwarded over very long distances. Here in Australia, the wormholes are using the Australian Academic Research Network (AARNet) to forward packets. AARNet is a very high bandwidth network that extends across the continent, with AARNet sites at all major academic institutions. AARNet itself forms part of the Internet, a large academic network which runs throughout America, Europe, Canada and Japan. The wormholes use the Internet as a carrier of packets, in a way that prevents the amateurs from accessing the Internet and vice versa.

## Wormhole Growth

In the last 12 months, wormholes have proliferated. Around August 1991, there were about a dozen wormholes. Now there are well over thirty, most of which are in America; the rest mainly in Canada, Europe and here. The sole Australian wormhole in 1991 in Canberra has now been joined by wormholes in Brisbane, Newcastle, Sydney and Melbourne. Even more gratifying, the number of ordinary packeteers using these wormholes has increased as well.

## Wormhole Services

The wormholes are usually made of computers running the NOS program, written by Phil Karn KA9Q, Gerard van der Grinten PA0GRI, Johan Reinolda WG7J and others. NOS provides normal AX.25 services, NETROM, and TCP/IP networking. Thus, the wormholes can forward many different types of amateur radio packets, not just the TCP/IP ones. Indeed, much of the wormhole traffic is either forwarding of bulletin board items via AX.25, or users exploring the NETROM nodes. However, as well as the packet forwarding services, many of the wormholes provide a wide range of user services. These include bulletin boards, binary and text file repositories available using a file transfer service, and personal mail service. These services are designed to bring the network to you, rather than the other way around — this decreases the load on the whole network, and localises the network traffic. For example, the wormhole in Canberra offers over 10 Megabytes of amateur information and programs to the local community. These are also available to all the other users who can connect in via the wormholes.

## New Wormhole Services

1992 has seen the refinement of an existing service, POP, and the arrival (in a big way) of a new service, Converse. POP is a personal mail server. Instead of having to leave your own TNC/computer running 24 hours a day, you obtain a mail account on the POP server. The POP server then collects your mail for you, and you can log in at intervals, and review/read your mail. This sort of service has been traditionally provided by bulletin boards, but POP has some advantages: it can collect mail from both AX.25 users and TCP/IP users, and a separate POP service takes the load off the bulletin board, leaving the latter to work solely on bulletins. The Converse service, however, is the biggest service to take off in 1992. If you have seen a DX Cluster, then you will know what Converse is like — a multi-person QSO. However, with the wormholes, the QSO is now global; nearly every day the Converse chat spans three continents: Australia, North America and Europe. Over a dozen wormholes support Converse. The nice thing about the Converse service is that it is all handled transparently for you. To join the conversation, you connect to your local Converse service — you are instantly connected to the rest of

the available Converse servers. And the service is optimised to only broadcast your packets to those servers that have active users; if a Converse server has no users, it receives no packets. Converse also has over 32,000 "channels", allowing you to move off to an unused channel if you only want to QSO with a few people, or on a particular topic.

## NETROM/AX.25 Parameter Standardisation

Because the wormholes forward not only TCP/IP packets, but AX.25 and NETROM packets, it was found necessary to standardise on the parameters controlling their exchange, especially for NETROM and its routing tables. The parameters used by the VK2 and VK3 wormholes (eg NETROM timers of 1800 and AX.25 link quality of 252) have been accepted and are now being used by the other wormholes, and other NETROM nodes as well.

## Internet Access by Amateurs

Not only is the Internet a fast way of forwarding amateur packets, it provides a wealth of programs and information to its normal users — so much so that it can sometimes appear daunting! Early on in 1992,



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there was a push to somehow make the resources of the Internet available to amateurs. This was done by having the amateur TCP/IP network (44.x.x.x) advertised to the whole of the Internet, and having one wormhole act as a gateway between the two. This proposal is a double-edged sword, as it allows amateur and non-amateur machines to communicate, which can in some cases be illegal. To prevent any sort of legal problems, the latest software used on the wormholes prevents Internet machines from connecting to amateur machines, while still allowing connections in the other direction. Thus, amateurs can access the services of the Internet, but not vice versa.

## The Future

1992 has seen more wormholes appear, with more services provided by these wormholes. At the same time, the wormhole operation has matured, providing more reliable service to their users. Who knows what the future will bring? However, I'd like to see the concept of bringing services to the user expanded, for the reasons stated above: to ease the load on the wide-area networks, and to speed up response time for the users. However, provision for two-way or multi-way conversations should not be ignored. Wormholes provide a fast and relatively cheap way of packet radio intercommunication over large distances, but I believe it's now time to start thinking about our own long-distance networks, as the wormholes are really not amateur radio, and we have no idea how long the gravy train will last. At the same time, the cost of even 9.6Kbps amateur connections is large, let alone 56Kbps. We should realise that although wormholes are not what we really want, they are there now and we may as well use their services until we can create our own. Finally, 1993 should see the relaxation of the laws governing amateur radio and packet radio operation in particular. It seems appropriate at this time to call for an end to the "protocol wars" that have plagued us over the past few years. We must realise that no one packet protocol is going to suit us all, and we should be tolerant of all protocols that amateurs use. As the regulations relax, I would like to see the development of new, experimental protocols (such as the PACSAT broadcast protocol) to make better use of our bandwidth. Thus, let us use the wormholes as an example for our future where multiple protocols are actively or passively supported, and network protocols and applications are designed to make best use of our frequencies. I hope we all can benefit from the resources provided by the wormholes, and at the same time I hope we can start the design of an amateur network that will make them obsolete.

If this has inspired you to want to start your own wormhole, please write to me first — several potential Australian wormholes did not eventuate due to the approaches made to AARNet institutions. For more information, please send some mail with details of your proposal to:

**Warren Toomey**  
Department of Computer Science  
University College, ADEA.  
Canberra, ACT. 2600.

ar

## Pounding Brass

*Gilbert Griffith VK3CQ 7 Church Street Bright Vic 3741*

### A Little More History of the Telegraph

Last month we left the five colonies of Western Australia, South Australia, Victoria, New South Wales and Queensland connected together by telegraph on 8th December 1877. Prior to this date was the completion of the most famous of endeavours by Charles Todd in 1872. The Overland Telegraph Line successfully linked Australia with the outside world for the first time. In January 1870 the government was informed by the British Telegraph Company that an undersea telegraph line would be brought ashore at Port Darwin. The original intention was to link up to the Queensland telegraph network at Burketown but Todd convinced the government that in eighteen months he could build a line from Adelaide to Darwin.

Those of us who have driven across the centre will have some idea of the trials that the overlanders would have experienced. The formidable and unknown country had previously been crossed only once by Stuart in 1862 (ten years previously), and had already claimed the lives of other explorers such as Burke and Wills as well as Leichhardt and his party. John Ross and his overlanders had to explore a route with the telegraph line in mind, meaning they had to map sources of timber and water for the following parties, as well as suitable trees for poles.

The northern section was supplied by ship from Adelaide to Port Darwin (via the East coast!) with no wharf or jetty available at Darwin. Animal losses were around 30% and even more. At the Roper River depot (96 miles up river) crocodiles would lie in wait for horses coming in for an evening drink at the river.

Despite monsoon weather and losses of stock and machinery in mud holes, the line heading south from Darwin was raised, only to have the poles condemned shortly thereafter due to termites. This necessitated the importation of iron poles from Britain for the affected sections.

It is difficult to imagine the hardships that would have been endured for a wage

of 20 shillings a week with 3 pairs of jeans or moleskins, 3 of boots, rifle, ammunition, 2 hats, belts, knives, pipes and tobacco for perks. In those days it might have been a very attractive wage despite the hardships. These days we are used to the convenience of fast and comfortable transport, power tools and so forth. It is essential to remember that all poles had to be cut by hand and the holes dug using special long-handled shovels to get the required depth of four feet. Then it was necessary to climb the pole each time to drive in the spikes for the insulators and again to install the wire, and all this in temperatures that would, these days, keep most tourists confined to their air-conditioned cars or coaches.

Not only did the telegraph network make overseas trading easier and stimulate commerce, but the fact that the overland telegraph itself was successfully completed removed much of the worry and stress from those who thought that the project would bankrupt the colony of South Australia. Real time transactions were now possible, and even clocks could be accurately set around the country. By 1900 telegraph lines in Australia covered 20,000 miles, with telephones being tried over some telegraph circuits. At the same time radio experiments were being carried out in Sydney. A mere 10 years later the Wireless Institute of New South Wales was formed.

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# Repeater Link

Will Mc Ghie 21 Waterloo Crescent, Lesmurdie 6076 VK6UU @VK6BBS

This month's Repeater Link has been produced by Will Scott VK4XP. Will (this could become confusing) has already written one article for Repeater Link and has followed it up with a simple in-band link controller. Will's previous article on categorising the various methods of linking resulted in comments from readers on some systems used in Australia. Some are variations on the basic systems as described by Will.

One such system is in operation in South Australia. The Barossa Valley ARC have set up a "satellite link repeater" system to extend the coverage of their VK5RBV voice repeater. What they have is a "simplex" repeater on 147.825. Users of the link transmit and receive on the same frequency, 147.825. The satellite link repeater receives the 147.825 signal and re-transmits it on 146.225 to repeater VK5RBV in Adelaide. The reverse happens with VK5RBV's signal being received by the simplex repeater and re-transmitted on 147.825. This simplex link repeater has the callign VK5RBG and consists of two receivers and two transmitters.

Where there was no access to VK5RBV now there is via VK5RBG on 147.825, into Adelaide. My thanks to Grant VK5ZWI who supplied the information. The following is from Will Scott VK4XP.

## Simple In-band Link Controller

Do you need to link one repeater to another? Do you want to use the simplest and cheapest method? Here is a proven method for linking two repeaters together using only one extra transceiver and a controller.

## Where can it be used?

This method has been used for several years now for the link from the Miriam Vale repeater on 7625 to the Bundaberg repeater on 6800. Miriam Vale is about 150 km north of Bundaberg and about 70 km south of Gladstone. The stretch between Gladstone and Bundaberg is very long and, except for one or two small towns, is virtually unpopulated.

Miriam Vale repeater was installed to cover this area and as there are no local radio amateurs in the service area, it was decided to link it to Bundaberg's 6800 repeater permanently.

Motoring radio amateurs now enjoy good coverage between Gladstone and Bundaberg with the associated company a

repeater can bring along the way. Naturally, this improves the safety coverage in this area as well.

Imagine you are about to conduct a W-CEN exercise in a repeater dead spot. What about a local repeater with a link to the main repeater? Something that can be set up quickly and easily.

If you have a similar situation which does not require a repeater link with any switching or fancy controls, then this controller may suit you.

## How does it work?

All repeaters feed received audio from their receiver into the microphone circuit of the transmitter. As well, when the mute relay opens on the receiver (the Carrier Operated relay or COR), the transmitter Press to Talk (PTT) is operated.

A transmitter timer is included to limit the maximum time the PTT is operated. Also a timer is placed onto the COR so that when the received signal stops, the COR continues to operate for a short period afterwards. This causes a tail to appear on the transmitter of the repeater.

Ident signals may also be connected if required into the COR/PTT circuit and the microphone input circuit. Whilst provision

is made on this controller for an ident, it is not described in this article.

Fig 1 shows a block diagram of how the controller is wired into the repeater and the link transceiver. This set up is used only on one end of the link. The transceiver is tuned to the distant repeater's frequency. This makes it an in-band link. No changes need to be made to the distant repeater.

The link transceiver connects into the controller as well as the transmitter and receiver of the repeater. It is wired so that when the COR opens on the repeater receiver, it operates both the transmitter's PTT and the link transceiver's PTT. A tail is applied only to the repeater's transmitter not the link transceiver. If it were applied to the link, a double tail would appear on the distant repeater.

The link transceiver's COR is also connected to the repeater's transmitter so that either the repeater's receiver or the link transceiver will key the local repeater's PTT.

## Repeater circuit

Please refer to Fig 2 to work through this explanation. The repeater's receiver operates its COR into PIN 1. The signal is inverted with ICI and passes through the tail circuit, D1, R2 and C1. Capacitor C1, nominally a 10  $\mu$ F, controls the tail length for the repeater. This is usually set to about 600 ms.

The signal then passes through the OR gate of ICI pin 8 and on to the connection for the optional ident. Diode D4 allows an OR function if the ident option is included. Otherwise components D4, R3 and C2 may be omitted.

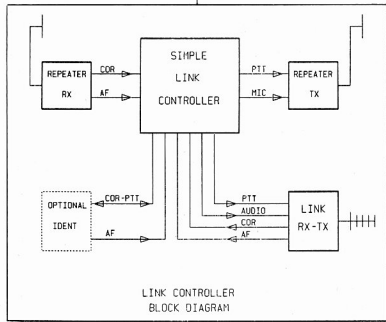


FIGURE 1

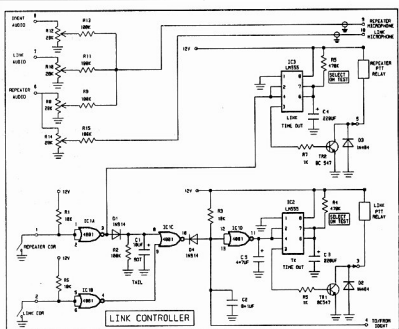


FIGURE 2

The signal is finally inverted again for correct sense and fed to the repeater timeout timer IC2, a 555 timer and its associated components. The output from the timer drives a buffer/inverter transistor which is used to key the PTT relay in the repeater's transmitter via pin 4. The transmitter timer is set by varying R4, nominally a 470K.

Usually the repeater has a timeout of three minutes. However, it is important that both the link timeout, described below, and the repeater timeout are set to exactly the same value.

This ensures that a conversation is not stopped on one repeater and continuing on the other, with confusion and much embarrassment.

Audio frequency (AF) from the receiver is fed into pin 6 of the controller. It is controlled by R8 then mixed with link AF from pin 7 and the optional ident from pin 8 through resistors R9, R11 and R13. Finally this is fed into the microphone circuit of the repeater's transmitter from pin 9.

Audio quality is important. Audio should be derived from as close as possible to the receiver's discriminator, but after the mute gate. As the level of the signal at this point may be low, it may be necessary to vary R9 and R11 to obtain the correct level for good deviation into the transmitter.

Similarly, the AF feed into the transmitter should be wired into a point after microphone pre-amplification, pre-emphasis and compression to maintain quality.

As an absolute last resort, audio may be

tapped across the receiver's speaker and after mixing in the level control, fed into the microphone input direct. The result may be that the link works but the audio quality will be poor.

This describes the repeater control circuit. It may, in fact be used to control any repeater without further modification.

## Link Circuit

The link transceiver's COR is fed into the controller on pin 2, inverted by IC1 and then ORed with the repeater's COR on pin 9 of IC1. You will notice the link COR is fed into the repeater's transmitter timer after the tail. So the tail on the repeater, when the signal is from the link, comes from the distant repeater.

Likewise, the signal fed to the timeout timer, IC3 comes from before the tail circuit — from IC1 pin 3. The timer is similar to the transmitter timeout timer and drives the link PTT circuit via TR2, an interface transistor.

Audio from the repeater's receiver is picked off using R14 and fed via a level limiting resistor, R15, to the link transmitter microphone input from pin 10 on the controller.

Once again, care must be taken in choosing the correct tapping and injection points for the audio in the link transceiver.

## Ident

An optional ident may be connected as shown to pin 4 for both COR and PTT and

to pin 8 for audio. A future article will describe a ROM based ident module.

One feature of the controller is that the ident, if fitted, only appears on the local repeater. It does not appear on the distant repeater. This is achieved by keying only the repeater transmitter's PTT during ident and by feeding the ident AF to the repeater's transmitter only. The ident AF does not go to the link transceiver, because the path back through R9 and R8 results in very high attenuation.

The control circuit may be built with all ident components included and the ident simply plugged in later.

## Construction

The controller may be built up on veroboard. It is not critical. Power should be 12V, fused with a 500 mA fuse. The zero volt side of the power supply should be grounded to the chassis, along with pin 12 of the controller.

Use shielded audio cable for AF connections.

Be sure to construct the unit well using a metal box for RF shielding. Take care with soldering and bolt things down well. Use good quality components and IC sockets where possible. You want this unit to be reliable. A service trip to a repeater to solder a dry joint can be very expensive and time consuming. Time spent now in good construction is built in insurance for the future.

## Testing and Set-up

Now finally you have built up the controller and are ready to test it.

Firstly, resist the temptation to just turn it on. Thoroughly check the circuit and ensure the resistance between pin 11, 12VDC, and pin 12, Ground, is at least a hundred ohms. If not, something is wrong, so check your wiring.

Test the controller by itself by connecting switches to ground from pin 1 and pin 2 to simulate COR inputs and relays to pins 3 and 5 to simulate PTTs. Leave the COR switches open. Power up! The relays may click but return to a relaxed state. Check the DC current into the controller. Depending on the relays used, current should be well below 250 mA. The unit without relays should draw between 20 and 50 mA.

Now operate the receiver COR. This simulates a signal being received on the main repeater. Both PTT relays should operate. If they don't, investigate why. Usually it will be a wiring error.

With the receiver COR off, switch the link COR on. This simulates a signal coming in from the distant repeater. Only the repeater's transceiver relay should operate.

Now, leaving the link COR on, turn on the repeater receiver's COR. The link relay should now operate while the transmitter



relay still holds in. This represents a station on the repeater breaking into the distant repeater's tail. Turn all COR's off.

Now for the timeout checks. Operate the receiver's COR and time the period for the transmitter's relay to drop out. It should be about 3 minutes. Also look out for the link PTT relay drop out. It should be within 2 seconds of the repeater transmitter's drop out. Adjust R4 to get the repeater transmitter right and R5 for the link. The timeout is reset by switching the receiver's COR off momentarily. Make sure both timeouts occur within 2 seconds of each other.

Finally test the tail of the repeater by operating the repeater's COR and timing the transmitter relay dropout. Adjust for about 600mS by changing C1.

### Radio Set up

The connections to the radios should now be made. It is good practice to use plugs and sockets so the radios can easily be disconnected for service and testing.

If the repeater was previously in service, the new controller replaces the existing one.

The first step is to fully test out the radios themselves. Make sure they are 100% on both receive and transmit.

Connect the radios into dummy loads. The mutes on both receivers should be closed. Now connect up the power to all units and switch on.

Next open the repeater receiver's mute and the COR should operate. Both transmitters should operate. Close the mute.

Now try the link mute. Only the repeater's transmitter should operate. Close the link mute to clear its COR.

Next open the link mute again, note the repeater's transmitter should operate, then open the repeater receiver's mute. This should cause the link transmitter to come on and the repeater's transmitter to remain on. Close all mutes and all transmitters should go off.

If you have not got this right you cannot proceed further. Once again check the wiring and connections.

### Audio Set-Up

Now to set up the audio. Set the correct deviation on both transmitters by using their local microphones. Usually it is 7.5 kHz peak for amateur operation. Normal speech should top about 5.5 to 6 kHz.

Next a 1000 Hz modulated RF signal set to about 50  $\mu$ V should be fed into the repeater's receiver. It should be deviated to about 4.5 kHz at the generator.

Both transmitters should operate as soon as the signal is applied to the receiver. Meter the level on both transmitters and set them also to 4.5 kHz for the link. If the levels cannot be set correctly, adjust R9 and R15 respectively. These two resistors should be

set up so that R8 and R14 are at mid range.

Watch transmitter time outs while setting up the audio. Just drop off the signal generator momentarily to reset them.

Now feed a signal into the link receiver. This time adjust R10 for correct level into repeater's transmitter. Resistor R11 is the coarse tune for this pot.

Go back and check the repeater's receiver level to the transmitters again as interaction may be occurring between pots.

The repeater and link are now ready for burn-in testing.

### Burn-in testing

A repeater and link should be reliable. An excellent way to check this is to leave the equipment running for several weeks connected up for general use. Naturally this is best done in town before taking it up onto the mountain.

Before final installation you should take some system measurements including power drain, transmitter and receiver operation, timeouts, tail lengths and so on.

### Final Installation

When installing in-band repeater linking watch out for desense of receivers by transmitters close by. This is particularly important when the distant repeater is also on the same band as the repeater with the link equipment. If problems occur, try positioning the link antenna away from the repeat-

er antennas. As well use directional antennas pointed 90 degrees apart if possible, first on the link and then if practical on the repeater.

Reducing the link transceiver power output and possibly the link receiver sensitivity often helps. A good link can work on 1 watt if the signals from the distant repeater are S9 or more.

Sometimes interfering RF is passed through the power supply from one radio to another. Make sure your supply is well filtered or operate with independent power supplies.

If the interference persists try physically separating the radios themselves. Also, make sure the earthing between the radios and controller is solid.

### Operation

You will find that once installed, your linked repeater system will behave as one. Usually stations will not even know they are linked. Suddenly the coverage of your repeater is doubled.

Any station that calls on one repeater will automatically appear on the other and vice versa. Operators will not need special training to use the link. They simply use either repeater as normal.

After constructing this unit and building your link you may wonder what all the fuss was about with linking repeaters.

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## Spotlight on SWLing

*Robin L Harwood VK7RH 52 Connaught Crescent  
West Launceston Tas 7250*

1993 has arrived and what surprises has this year to offer? It's impossible to say, but a recent symposium at the VOA in Washington DC, stated that shortwave broadcasting will be continuing, particularly as the technology isn't as advanced in the developing world with the economic costs of acquiring it beyond the reach of many. This symposium was sponsored by the United States Information Agency — the parent organisation of the VOA and allowed many broadcasters to share their views regarding the future of shortwave radio towards the 21st Century.

In the past three years, satellite based systems for delivery of programming have dramatically increased, particularly in Europe and many broadcasters such as DW and Austria Radio International frequently mention the transponders in use. These transponders are designed for rebroadcasting, primarily by cable systems and/or

diplomatic missions yet there are an increasing number of private listeners complete with their own decoding equipment to add to their dishes. These are mainly found in Europe with some in North America, yet these can be numbered in the low thousands, compared to the millions who still use shortwave radio in these target areas.

Broadcasters such as the BBC External Services have done serious market research on what their audiences expect and require from their broadcasters. However others are still continuing with programming from domestic sources or have a narrow operational base that doesn't relate to what the audience wants. The largest audiences so far are in West Africa, the Indian sub-continent, China and the CIS nations compared to the North American audience which is one of the smallest. The trend to establish a MW or FM relay within the target area is increasing with many internation-

al stations now easily heard in many major European capitals.

While on that point, I notice that the BBC World Service is now available on a sub-carrier of two public broadcasters in Melbourne and Sydney. This 24 hours a day service will be on a subscription basis with a special decoder being on loan from the BBC. A program guide is also provided. For further details contact the Australian office of the BBC World Service, Suite 101, 80 William Street, East Sydney NSW. Telephone (02) 331 7744. The subscription is around \$150 annually, I believe.

On the 23rd of October last year, a special transmission was heard in Australia by some shortwave enthusiasts. It came from the remote Atlantic island of St Helena, which is known from the history books as the place where Napoleon Bonaparte was sent into exile and died. A sender of Cable & Wireless was utilised for the two hour transmission in English around the local sunrise here in eastern Australia. The frequency varied but was approximately 11092

USB. Many DXers called the station on the phone and via fax. Sadly though, I unfortunately missed out as I'm still plagued by the PLL on my ICOM R70 unlocking at the most inconvenient times.

Standard Frequency and Time Station-VNG has now added another channel to its services. It is now on 2.5 MHz as well as 5 MHz, and from 2200 to 1000 UTC on 16 MHz. There is a talking clock plus an identification announcement given every 15 minutes. VNG, which is based at the CAA HF site in Llandilo NSW, also operates on 8.638 MHz and 12.984 MHz, which are on loan from the Royal Australian Navy. Identification is given on A1A and not on voice, although you can faintly hear the voice announcements.

Well, that is all for this month. Just a reminder, you can now leave messages for me on packet addressed as follows :- VK7RH @ VK7BBS Launceston TAS. AUS. OC.

Until next time, the best of 73 — Robin L. Harwood VK7RH.

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nicate with Hobart using a handheld rig. The link is activated by using a sub-tone of 250.3 Hz, selected because no modifications were necessary to the repeaters and the tone could pass through a repeater with little attenuation.

## Bangladesh

Special mention should be made of the contact between Rex VK8RH and S21ZE in Bangladesh at 1405 on 11/10/92. Apparently Andy VK8AH was the first to hear the station, at 1400, of the dx-pedition mounted by two Japanese stations, but was unable to complete a contact due to low power and a small antenna.

Andy advised Rex who has a larger station and a two-way CW QSO resulted, giving him the first ever VK to S21 contact. Good work gentlemen.

Scott Watson VK2JSR/VK4JSR writes enclosing a packet message from Ken JA3EGE which lists the various Spanish stations authorised to use 50 MHz. Briefly there are 17 in EH1, 5 EH2, 24 EH3, 6 EH4, 5 EH5, 16 EH7, all these being in Spain itself, 5 EH6 on Balearic Island, EH8ACW on Canary Island and EH9IB and EH9HM Ceuta and Melilla; so it is possible to work four countries with the EH prefix. This information may not now help VK stations but could interest overseas stations.

# VHF/UHF An Expanding World

*Eric Jamieson VK5LP PO Box 169 Meningie South Australia 5264*

*All times are UTC*

## Six metres

Rather surprisingly, six metres has been relatively quiet, with a little F2 propagation and a small amount of Es. 28/10: 0030 VK4BRG and VK4JH, 0330 JAs and VK2QF worked HL9UH, 2310 VK4WTN 5x9. Through November, mainly VK4s and JAs.

Via F2, Steve VK6PA on 1/11 from 0830 worked 9H1BT, 9H5ET, 9H1PA, 9H1ET and 9H1AZ, the latter transmitting 10 watts! During the 40 minute opening signals varied from S3 to S9. No other signals were heard. On 11/11 at 0900 Steve VK3OT had a rare opening to Europe when he worked PE1JKW at 539. This was 12 months after a similar opening. 19/11: 0040 VK4JH, 0500 pagers to 40 MHz, 0605 VK4BRG who said he had earlier worked K6MYC/KH6 as did stations in Brisbane. During the week ending 20/11 six metres operation in VK5 was frequently interrupted by thunderstorms appearing most afternoons.

Graham VK6RO said that on 20/10 he worked HL9UH and JAs were strong in Perth on 7/11 and 8/11. John VK4ZJB worked T30JH on 2/11 and reported that ZLs had worked W on 30/10. From time

to time brief Es openings have occurred from VK3 and VK5 to VK4, sometimes lasting only a minute. The Toowoomba Channel 0 transmitter is occasionally heard strongly and has been noted in Europe.

Ron VK4BRG writes that it has been very quiet at Sarina, no new countries worked. Isolated very strong TEU openings to JA and KH6. Only other items in log are HL9UH on 26/9, T30JH on 29/9 and 2/11, N1GE and KH6IAA at 0237 on 15/11.

Joe VK7JG sent his Six Metres Standing List upgrade and advised that pressure of work kept him off six metres for much of Cycle 22. Also, during that time, a shack rebuild was necessary, including the construction of a 45 foot (14 m) tilt-over tower, but not all aeriels are attached. He hopes to have his 1296 MHz gear again operational at this summer.

Joe also advises that after 12 years operation, the six metre beacon VK7RNT, is to be closed down for the time being, having served its useful purpose. It may be re-installed in the future from a common site with beacons on 144, 432 and 1296 MHz. Details later.

Recently, Joe built an RF link to connect VK7RAB 438.55 repeater in northern Tasmania to VK7RAF 147.250 in the south. Amateurs in Launceston can now commu-

## MD5KW

Dave ZLIAFQ has written regarding my query on the callsign MD5KW and drew my attention to a reference on the matter in John Clarricoats (G6CL) book *World At Their Fingertips*. John reports on the first two-way Transatlantic contact on 50 Mc/s between Ed Tilton W1HDQ and Denis Heightman G6DH on 5 November 1947, and then goes on to say that two days later Heightman made contact on 50 Mc/s with Major Ken Ellis, G5KW, then operating as MD5KW from the Suez Canal Zone — the first contact between the UK and this area. Minutes later Ellis worked E J Laker, G6LK and W.E. Russell, G5WP — both located in Surrey. So the first contacts associated with MD5KW have been tabulated in Australia and I thank all who have contributed. Incidentally, Dave ZLIAFQ says that John Clarricoats book should be required reading for VHF enthusiasts.

## Reports from Europe

Ted Collins G4UPS, says the K1NFE beacon on 50.061 is off the air, as also is 9L1SL on 50.091. The Slovenia beacon 4N3SIX on 50.015 has changed its callsign to S55ZRS.

From 24/10 the Republic of Slovenia changed its callsign prefix from YU3/YT3 to S5 plus a figure from 1 to 9 plus the individual suffix.

## Lebanon

OD5SK has a 160 watt linear courtesy of JA1VOK, plus a five element yagi. There is still no sign of the OD5SIX beacon.

## Jan Mayen Island

This remote island in the Arctic Ocean is now operational on six metres. The first contact with JX3EX was made by SM3JGG on 2035 on 13/10. The JX7DFA beacon runs 10 watts on 50.079.

The October report tends to indicate a lack of F2 propagation from Europe, with contacts via TEP or Es. Those heard/worked included 3X0HNU, 4N3SIX/b, 7Q7CM, 7Q7JL, 7Q7LA, 7Q7RM, 7Q7XX, 9H1PA, 9H5AB, 9H5EE, 9H5ET, CN8ST, CT0WW/b, CT1BGE, DJ1JO, DJ3TF, EH2AGZ, EH6ET, EH7AJ, EH7ERS, EH9IB, FC1JG, IK3GHZ, IK5NTE, IK8DYD, IT9IPQ, IV3GBO, OE6LOG, OE9FKI, OKIMAC, OK2PZW, OK3LQ, PY5CC, S51CN, SM3EQY, SM7BAE, V51VHF/b, YT3EY, YU2IQ, YU3OV, YU3ZW, ZB0T, ZP5JCY, ZS6AXT, ZS6WB, ZS6XJ, ZS9A.

Geoff Brown GJ4ICD said that from Jersey Island on 4/10 there was a TEP opening to South America with ZP5, PY5 and LU being worked and CE heard. There were a few openings to Africa and at the end of the month VK TV was heard on 46.249.5 MHz.

Other TEP openings were on 9/10 when ZS6WB reported the 5B4CY beacon at 1630, on 11/10 with ZS6, A22 and 7Q7 all strong. 12/10 started off well with Es to Spain, then linked up with TEP to provide a strong path to PY5, LU, CX and CE.

From 13/10 onwards Es openings predominated and provided contacts to I7, I8, YU3, SP, EH9 and CN8.

## The World Above 50 MHz

After nearly 18 years, Bill Tynan W3XO/5 has finally relinquished his position as conductor of the QST "The World Above 50 MHz" columns. For many years Bill and I have exchanged VHF/UHF notes and this has given us an opportunity of getting to know one another. A highlight had to be on 8 May 1991 when I managed to work Bill on six metres during a five minute opening, giving him his first VK5 contact. The most disappointing aspect of our association was later that year when Bill, during a visit to Australia, called at my house to see me and I was in Adelaide for a medical appointment — the only day I had been absent during the previous two months! I wish Bill every success in his future usage of the VHF bands, and look forward to continuing the exchange of information with the new "baton holder," Emil Pocock W3EP, who is a well known QST author and VHF/UHF experimenter.

Bill's final notes in November QST largely concern the Perseids Meteor Shower from 11/7 to 11/8. On the latter date KJ7F said that two metres sounded like 20 metres during a contest! Large tropo openings also occurred 7 to 9/8, but the best was 21 to 23/8 and involved considerably enhanced operation on all bands to 3456 MHz. On 21/8 a 10 GHz all home station contact took place between Chuck WA6EXV in DMI5dp and Phil W6HCC DMI3my. The path from Chuck's 2500 foot (762 m) location to Phil's 2000 foot (610 m) location had to cross the 5000 foot (1524 m) El Paso Mountain range, scatter for about 75 miles (121 km) before knife edging over the 6000 foot (1829 m) San Bernardino Mountains. Bill comments — "who said there had to be line of sight!". The equipment was SSB/CW.

The first notes from Emil Pocock W3EP are for December 1992 and he gives considerable space to the propagation results which came from a large high pressure system, commencing 11 September, which resulted in two metres and above contacts over a vast area of central to eastern USA, encompassing portions of grid squares EL, EM, EN, FM and FN, with a central high pressure reading of 1028 millibars. (This is nearly as great a high as that which encompassed Australia on 16 March 1988 with a reading of 1032 MB) W2SZ/1 had contacts on 144, 222, 432 and 1296 MHz at distances of over 1850 km (the same from Adelaide to Albany.)

Many other stations had contacts in the 1000 km plus range. The enhanced conditions lasted for six days, so anyone who missed out must have been watching too much television!

If you are into contacts via meteor showers, keep in mind that the Quadrantids meteors peak at 1234 on 3 January 1993.

## Vale VK6FM

The November issue of the West Australian VHF Group Newsletter gives prominence to the recent passing of Ron (Flash) Mould VK6FM, who was a foundation member of the Group.

Ron was an enthusiastic home-brew constructor and looking to build something bigger and better. One project was to construct a five over five over five antenna system for six metres! It was not certain whether the antenna was completed, but Ron certainly tried.

In latter years Ron was constructing a ten metre parabolic antenna for EME work on 1296 MHz, but failing health was to overtake him before it could be completed. He died on 14 October 1992 after a long illness.

## Countries worked from Australia on six metres

The following are amendments to the December 1992 list.

Delete: HC5K Galapagos; HK0/W6KV Malpelo; VK2BZ Australia. Change: 4X1IF to 25/10/91 and shared by VK8AH and VK8RH; 6Y5RC to 6Y5FS on 24/03/90, VK2BA; AH8A to 19/04/81, VK2VC; C21AA to 20/12/70, VK4ZRW (VK4IT); CT1LN to 03/03/90, VK4RO; DLOSI to DLH8CK on 12/10/89, VK8ZLX; HC2BI to HC5K on 26/03/89, VK2MQ; HL9WI to 15/04/70, VK4ZRW (VK4IT); T30DJ to T3AZ on 17/03/80, VK4RO; V56AB to V56HK on 05/05/78, VK4RO; YB9X to YB0X on 01/05/79, VK4RO; YV5/DL3ZM to 18/03/81, VK4RO; ZD8TC to 20/03/82, VK4RO; ZL2DS to ZL2MF on 21/12/47, VK5GF (SK); ZL9TPY to 21/01/90, VK2VC.

Following the vast number of changes to the original November list, the above represents only a small change to the December listing. There are likely to be others as times are sorted. The complete list now contains 164 countries strictly in accordance with the May 1992 ARRL DXCC Countries List.

## The bands above 50 MHz

Scott VK2JSR/VK4JSR reports that activity from VK4 and northern VK2 is alive and well. The regular skeds at 0730 (NSW local time) on Saturdays and Sundays, and 2030 (NSW local time) on Mondays, Wednesdays and Fridays, continue between Gordon VK2ZAB and Ross VK2DVZ to those on the northern end of the path, namely VK2EA Lismore (144), VK2JSR/VK4JSR Alstonville (144-432), VK4ARN, VK4KZR, VK4DH, all in Brisbane north and on 144-432. VK4YZ Caboolture (144). Reports being passed on the two metre repeater indicate there are a number of listeners.

The majority of these paths are covered by aircraft enhancement modes with contact peaks lasting for up to 5 minutes with a second peak/plane around 20 minutes later. In addition, regular morning tropo also occurs. Thanks Scott, I'm glad I asked about activity. It would now be worth hearing from the Perth region!

## Closure

Hopefully, next month there will be more VK activity to report but so far Es has been very slow to provide any sustained contacts. Closing with two thoughts for the month:

1. If at first you don't succeed, try, try again. Then give up, there's no use in being a damn fool about it, and,
2. We are not primarily put on this earth to see through one another, but to see one another through.

All the best for 1993, and 73 from The Voice by the Lake.

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# HAMADS

## TRADE ADS

● **AMIDON FERROMAGNETIC CORES:** For all RF applications. Send business size SASE for data/price to RJ & US Imports, PO Box 431, Kiama NSW 2533 (no enquiries at office please ... 14 Boany Ave Kiama). Agencies at: Geoff Wood Electronics, Sydney; Webb Electronics, Albany; Assoc TV Service, Hobart; Truscotts Electronic World, Melbourne.

● **WEATHER FAX programs for IBM XT/ATs \*\*\* "RADFAX2"** \$35-00, is a high resolution short-wave weatherfax, morse and RTTY receiving program. Suitable for CGA, EGA, VGA and Hercules cards (state which). Needs SSB HF radio and RADFAX decoder. \*\*\* **"SATFAX"** \$45-00, is a NOAA, Meteor and GMS weather satellite picture receiving program. Needs EGA or VGA & WEATHER FAX PC card, + 137 MHz Receiver. \*\*\* **"MAXISAT"** \$75-00 is similar to SATFAX but needs 2 MB of expanded memory (EMS 3.6 or 4.0) and 1024 x 768 SVGA card. All programs are on 5.25" or 3.5" disks (state which) plus documentation, add \$3-00 postage. ONLY from M Delahunt, 42 Villiers St, New Farm QLD 4005. Ph (07) 358 2785.

## FOR SALE NSW

● **YAESU FL2100B Linear:** SN5H310330 plus four slightly used 572B finals, \$1,400 ONO; **KENWOOD TS520S xcvr**, exc cond, desk mic, manual, two spare finals (unused), \$600 ONO, **TK2GZ QTHR** (069) 62 3576.

## FOR SALE VIC

● **SHACK CLEARANCE**, no reasonable offer refused, **DRAKE TX4C/R4C**, **FTDX400**, **FTDX401**, **ICOM IC22A**, **VINTEN MR6 2m** (240v), **VINTEN 6m** test equipment, new **Rx/Tx valves**, **Books**, **Co-ax**, **Collectors' Army 19 set**, **MN26 R/Compass**, **EDDYSTONE 640 Rx**, lots more, **Len VK3LP QTHR** (054) 72 3797.

● **QRM FREE LOCATION**, 3Bedr house located in Mt Beauty NE Vic, Skiing, Bushwalking, Trout Fishing Mecca, Tower with rotator fitted, shack adjoins house, \$49,000 **VK3DUG** (057) 57 2814.

● **DECEASED ESTATE** of the late John Poland VK3GZ; **ICOM IC751** (S/N 01309) HF Txcvr with PS35 inbuilt PSU, AT500 ATU (S/N 05255), & SM8 desk mic, \$2450 ONO; **ICOM IC25A 2m FM mobile** (S/N 21628) \$350 ONO; **KENWOOD TS120S** (S/N 0010067), AT120 ATU (S/N 960862) & DFC230 Freq Cont (S/N 1041385), \$750 ONO; **ATN 13-30-8 Log Periodic Ant**, \$550 ONO; **DS1136 Multi Meter** \$30; **UNIDEN Mobile Mic** \$10; **SWR Meters** model 176 with matcher \$10, **MICRONA HF** \$10, **OSCAR-BLOC SWR200** (S/N 55236) \$80; **GDO Lafayette** (S/N 992503) \$30; enquiries to Tom **VK3XBG QTHR** or tel (051) 94 2240.

## FOR SALE QLD

● **HEWLETT PACKARD** sig gen 608-D, covers 10 to 420 MHz, good order, \$150; 7 disks communication progs suit **AMIGA**, \$20; **Herb VK4KM** (071) 64 2202.

● **VALVES**, **PWR TFRMRS**, old radio parts, send your wanted list incl Tx valves. Can anyone use B&W pic tubes, LOPF yokes, etc (new) for B&W TV (valve types), give away price, subject to offer & collection, **Fred Chappel VK4DY** PO Box 17 Woodford Qld 4514.

● **KENWOOD TS820S** (Digital) with ext VFO820, **DRAKE** low pass filter, **QUEMENT PWR/SWR** meter, **Mic**, **Manuals**, and homebuilt Antenna Tuner 10,15,20. New finals recently fitted. Licenced amateurs only please \$525 the lot. **Bob** (07) 207 6715.

## FOR SALE SA

● **TENTEC OMNI-D546 HF** xcvr and matching PSU, \$900; **KENWOOD TS120S HF** xcvr, \$550; **YAESU FT290R 2m** xcvr with Nicads, \$380; **YAESU FT221R 2m** base stn with inbuilt PSU, \$400; **YAESU FT680R 6m** mobile xcvr, \$450; **YAESU FT2700RH dual xcvr** 2m & 70cm mobile, \$800; **TRANSWORLD SS** Linear amp with PSU (100A) \$950; **KENWOOD ATU AT230**, \$280; **KENWOOD** monitor with BS8 pan display SM220, \$490; **John Gill VK5AJG**, QTHR, (08) 296 8705.

## FOR SALE WA

● **ICOM IC551 6m 10W** base, 12V, S/N 02702, \$350; **ICOM AT100 Auto tuner** S/N 02159, \$250; **DAIWA** rotator 7600A, 200kg vert load, \$190; **Graham VK6RO QTHR** (094) 51 3561.

## WANTED NSW

● **FV101B** ext VFO in wkg order, **TELONIC RHO** detector or straight detectors in any cond; **WAGNER C1-25** service manual, circ diag etc, all costs paid; **Ray VK2FW**, QTHR, (063) 65 3410.

● **YAESU FT690R 6m** txcvr or similar unit; **Rick VK2XRB** (047) 51 2847 after 6 pm.

## WANTED VIC

● **DONATION OF WORD PROCESSING SOFTWARE** for **AMSTRAD CPC6128** CP/M computer. The recipient is an Anglican Minister of Religion who is involved with the on-going welfare of frail and aged citizens in a large hostel, but has little funding or resources. All freight costs will be re-imbursed. Please contact **Bruce VK3UV QTHR** (03) 580 6424, mobile 018 386 030.

● **YAESU FT7 Txcvr** or similar in VGC, **VK3DSS** (03) 870 8335.

● 3/8 inch to 1/4 inch shaft reducers, **Tony VK3CTM QTHR** (03) 878 4460.

## WANTED QLD

● **SONY ICF2020** or **ICF 2001** comm rx or similar, **Doug Macleod**, 23 Barellan Ave, Budinda Qld 4575, **VK4DNM** (074) 44 2170.

## MISCELLANEOUS

● **TOWN HOUSE FOR RENT**, two story two bedr house in Lakemba (Sydney suburb), complete with 45ft mast, rotator and Yagis, 4el 10m, 4el 15m & 12m, 12 el 2m. Good sigs all directions. \$160 PW (02) 750 8851 A hrs or (02) 692 2133 Bus, ask for Murray, **VK2KGM**, QTHR.

● **HAVING A SHACK CLEAROUT ?** Please dont throw out those QSL cards. Old and new QSLs are very welcome by the **WIA QSL** collection. Contact **Hon Curator**, **Ken Matchett**, **VK3TL**, 4 Sunrise Hill Road, Montrose Vic 3165. Tel (03) 728 5350.

ar

## LIMITED STOCKS STILL AVAILABLE

## 1993 AUSTRALIAN RADIO AMATEUR CALL BOOK

- Callsign and SWL listings.
- Repeater and Beacon information
- Bandplans
- Distance records
- WIA Awards and Contests and much more updated information.

## CHECK WITH YOUR DIVISIONAL BOOKSHOP NOW

Cover price: \$12.50

Special price to WIA members \$11.00 plus post and handling when applicable.

# Morseword 70

|    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|----|---|---|---|---|---|---|---|---|---|----|
| 1  |   |   |   |   |   |   |   |   |   |    |
| 2  |   |   |   |   |   |   |   |   |   |    |
| 3  |   |   |   |   |   |   |   |   |   |    |
| 4  |   |   |   |   |   |   |   |   |   |    |
| 5  |   |   |   |   |   |   |   |   |   |    |
| 6  |   |   |   |   |   |   |   |   |   |    |
| 7  |   |   |   |   |   |   |   |   |   |    |
| 8  |   |   |   |   |   |   |   |   |   |    |
| 9  |   |   |   |   |   |   |   |   |   |    |
| 10 |   |   |   |   |   |   |   |   |   |    |

© Audrey Ryan 1992

## Across:

- Public Transport
- Stun
- Wander
- Errors
- Unopened flower
- Sense
- Seeded
- Ache
- Magistrate
- Church Service

## Down:

- Tremendous
- Unfit
- Took to court
- Bunch of fives
- Legumes
- Winter month
- Leafy
- On behalf of
- Flame
- Employer

Solution Page 56

# Hamads

**Please Note:** If you are advertising items For Sale and Wanted please use a separate form for each. Include all details; eg Name, Address, Telephone Number (and STD code), on both forms. Please print copy for your Hamad as clearly as possible.

\*Eight lines per issue free to all WIA members, ninth line for name and address

Commercial rates apply for non-members. Please enclose a mailing label from this magazine with your Hamad.

\*Deceased Estates: The full Hamad will appear in AR, even if the ad is not fully radio equipment.

\*Copy typed or in block letters to PO Box 300,

Caulfield South, Vic 3162, by the deadline as indicated on page 1 of each issue.

\*QTHR means address is correct as set out in the WIA current Call Book.

\*WIA policy recommends that Hamads include the serial number of all equipment offered for sale.

\*Please enclose a self addressed stamped envelope if an acknowledgement is required that the Hamad has been received.

Ordinary Hamads submitted from members who are deemed to be in general electronics retail and wholesale distributive trades should be certified as referring only to private articles not being re-sold for merchandising purposes.

Conditions for commercial advertising are as follows: \$25.00 for four lines, plus \$2.25 per line (or part thereof) Minimum charge — \$25.00 pre-payable.

State: .....

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**Not for publication:**

☐ Miscellaneous

☐ For Sale

☐ Wanted

Name: ..... Call Sign: ..... Address: .....

## Solution to Morseword No 70

Page 55

|    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|----|---|---|---|---|---|---|---|---|---|----|
| 1  | . | . | . | . | . | . | . | . | . | .  |
| 2  | . | . | . | . | . | . | . | . | . | .  |
| 3  | . | . | . | . | . | . | . | . | . | .  |
| 4  | . | . | . | . | . | . | . | . | . | .  |
| 5  | . | . | . | . | . | . | . | . | . | .  |
| 6  | . | . | . | . | . | . | . | . | . | .  |
| 7  | . | . | . | . | . | . | . | . | . | .  |
| 8  | . | . | . | . | . | . | . | . | . | .  |
| 9  | . | . | . | . | . | . | . | . | . | .  |
| 10 | . | . | . | . | . | . | . | . | . | .  |

### Solution to Morseword 70

Across: 1 bus; 2 daze; 3 roam; 4 sins; 5 bud; 6 feel; 7 rated; 8 pain; 9 beak; 10 Mass.

Down: 1 great; 2 inept; 3 sued; 4 fist; 5 peas; 6 June; 7 green; 8 for; 9 fire; 10 user.

## HOW TO JOIN THE WIA

Fill out the following form and send to:

The Membership Secretary  
Wireless Institute of Australia  
PO Box 300  
Caulfield South, Vic 3162

I wish to obtain further information  
about the WIA.

Mr, Mrs, Miss, Ms:.....

Call Sign (if applicable):.....

Address:.....

State and Postcode:.....

### TRADE PRACTICES ACT

It is impossible for us to ensure the advertisements submitted for publication comply with the Trade Practices Act 1974. Therefore advertisers and advertising agents will appreciate the absolute need for themselves to ensure that, the provisions of the Act are complied with strictly.

### VICTORIAN CONSUMER AFFAIRS ACT

All advertisers are advised that advertisements containing only a PO Box number as the address cannot be accepted without the addition of the business address of the box-holder or seller of the goods.

TYPESETTING: Industrial Printing  
AND PRINTING: 122 Dover Street,  
Richmond, 3121  
Telephone: 428 2958

MAIL DISTRIBUTION: R L Polk &  
Co Pty Ltd  
98 Herbert St,  
Northcote,  
Vic. 3070  
Tel: (03) 482 2955

The opinions expressed in this publication do not necessarily reflect the official view of the WIA, and the WIA cannot be held responsible for incorrect information published.

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## VK QSL Bureaux

The official list of VK QSL Bureaux. All are Inwards and Outwards unless otherwise stated.

|         |   |
|---------|---|
| VK1     | GPO Box 600 Canberra ACT 2601                           |
| VK2     | PO Box 73 Teralba NSW 2284                              |
| VK3     | 40G Victory Boulevard, Ashburton VIC 3147               |
| VK4     | GPO Box 638 Brisbane Qld 4001                           |
| VK5     | PO Box 10092 Gouger Street Adelaide SA 5000             |
| VK6     | GPO Box F319 Perth WA 6001                              |
| VK7     | GPO Box 371D Hobart Tas 7001                            |
| VK8     | C/o H G Andersson VK8HA<br>Box 619 Humpty Doo NT 0836   |
| VK9/VK0 | C/o Neil Penfold VK6NE<br>2 Moss Court Kingsley WA 6026 |





IC-765

# Our Base Units Have So Many Features, These Pictures Speak Louder Than Words.



IC-781

**O**ur features speak volumes. Rather than write hundreds of words to introduce our range of base units, we'd like you to phone us free on (008) 338 915. We'll provide you with detailed brochures

and the name of your nearest authorised Icom dealer.

Alternatively, you can write to Reply Paid 1009 Icom Australia Pty Ltd P.O. Box 1162 Windsor Victoria 3181. Telephone (03) 529 7582 A.C.N. 006 092 575